Natural History Notes.

EDITED BY

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SECOND SERIES. MONTHLY. [VOL. I., NO. 1.

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FRANK J. ROWBOTHAM.

JANUARY, 1881.

EDITORIAL.

WITH the present number of NATURAL HISTORY NOTES a new series commences, which, though founded on a broader basis than its predecessor, will in nowise depart in principle from the original plan laid down; whilst, in point of practical details, we trust, our readers will find considerable improvement. The extent of our Journal, it is true, is at present somewhat limited; but we hope ere long, through the cordial support (which we confidently anticipate) of our contributors, to be enabled to increase its size.

Our ability to do so will, however, depend in great measure upon the *circulation* of the magazine. The number of subscribers, whilst still far below the standard which we could wish it to attain, is nevertheless receiving fresh additions from day to day, through the assistance of some of our present subscribers in canvassing for additional names. Such assistance, we beg leave to assure them, is gratefully appreciated by us, and will serve to stimulate our editorial faculties to the end that we may lay before our readers such matter as will best repay perusal.

And here we would remark that in collecting material for these pages, we are mainly dependent upon our subscribers, and our editorial labours would in no small degree be lightened could we but feel assured of their hearty and conjoint support in supplying our pages with notes or articles on Natural History subjects. Many readers who, like ourselves, are students of nature, doubtless keep a *note-book* or something of the kind,

and are therefore competent, should they possess the desire, to do their part in helping to support NATURAL HISTORY NOTES by sending extracts from time to time of such of their records as they may deem of interest, feeling confident the while that their communications will always receive a ready welcome at our hands.

Although the ability to make notes and observations upon natural objects rests more of course with our country subscribers than those resident in the metropolis, still we would remind these latter also that even in London a vast amount of scientific material lies ready to the hand, only waiting to be made the subject of attention; and to those of our readers who plead insufficiency of time as an excuse for not keeping a *regular* note-book, we would point out that by contributing their 'mites' towards the maintenance of our Journal, they not only derive satisfaction for themselves by so doing, but may be the means of rendering valuable assistance to the progress of science in general.

It is our intention also to give abstracts, where procurable, of papers read before the smaller local scientific societies, many of which have as yet no official publication of their own.

An "Exchange Column" will likewise be opened, but for the insertion of advertisements in it we are reluctantly compelled to make a small charge, as it will entail additional printing, which the present rate of subscription will not cover.

We need scarcely add that any suggestions from our readers relative to the method of conducting the Journal will be heartily welcome, and receive full consideration at our hands.

FLEAS AND FLEA-POISONS.

HAVING for many years, by day and, alas, by night, profoundly studied the life-history of Fleas, reciprocating thus their *lively* interest in me at home and abroad, in great and small, famous, or obscure cities, such as London, Rome, Naples, Constantinople, &c., &c., I am persuaded to

write a few words about these insects; hoping that I shall not be tempted, by the many sensational points of the subject, to expound my few remarks into a long essay or lengthy article beyond the limits of a column or so in NATURAL HISTORY NOTES.

Fleas, then,—the catching, feeding, breeding, training, and killing of fleas:—

First,—to catch your flea is by no means so difficult an affair as it is generally considered, the manners and customs of this creature being as necessary for us to acquaint ourselves with as those of any other animals which entice us to "le sport."

The knowledge that the house-fly when disturbed always flies *upwards* is the basis of the construction of all glasses, wire-gauze traps, &c., which are set to attract and catch them; and the knowledge of that amiable weakness of the flea, when disturbed, to hop or drop *downwards*, has been a so well-known and comforting dispensation, or "law of nature," that the peasants of all countries over-populated by these insects, and also intelligent travellers, constantly resort to the expedient of divesting themselves of their day costumes and clothing over a basin, or bath of water, into which the creatures recklessly fall, from nervousness, disregard of life, or desire, by committing suicide, to atone for miseries inflicted on their betters (that is, of course, assuming water could drown a flea); or the traveller disrobes himself over a mass of woollen material, into which the creature drops, and instantly, ostrich-like, dives its head among the fibres and considers itself hidden from the huntsman.

In either way your victim is easily caught, whether to "undergo the extreme penalty," or to be studied and experimented upon by the philosophical sufferer.

In Germany and elsewhere, I have seen old women purchase, and keep by them, a small square of very fluffy blanket, which, rapidly laid on the limb whereon the *pulex irritans* has elected to partake of his frugal meal, will disturb and attract the creature to find shelter in it, and thus be easily entrapped, as the hairs on the legs get entangled in the fluffy threads, and the insect can only slowly escape.

Having caught your specimen, drop it into a test-tube, or standing narrow cylinder of glass, about three quarters of an inch in diameter, and cover it with paper pierced with pinholes, or leave it uncovered,

provided the tube be seven inches in height; for, by another pleasant and useful dispensation of nature, a flea, in consequence of the position of the posterior tarsi (or *hoppers*), cannot spring perpendicularly to a height beyond six or seven inches.

Indeed, a flea may confuse one by the seeming height and rapidity of its movements; but they are not as rapid, nor as high as we, in our irritation and misery, imagine. Give the creature space in all directions and it has leverage sufficient to increase the spring to 9 inches, and that is enough; but in a perpendicular tube of 7 inches it makes vain efforts to spring out of it.

You can keep one, two, or a colony together and watch them; and they are as individual in character, temper, and habit to the eye of a real observer as sheep are to the shepherd.

Invert the tube on your arm, and steadily watch them as they feed. Be calm—and then the bite will be scarcely felt. They occupy sometimes twenty good minutes on a repast, which costs you little; for the size of a flea is only about the twentieth part of one drop of water.

Fleas are tameable. Wild, or newly caught ones, will not come at the sound of the dinner-gong. You invert the tube. The old habitues fall-to at once. The "new boarders" waste the time in dancing, and have, at the expiration of the half-hour, to be dismissed with the rest. They soon learn to be punctual. After dinner (they will live and thrive for months upon only one good meal a day), they will bury their noses in any atom of woollen cloth and sleep profoundly.

They are easily trained; but to drill them requires the manipulation of an expert. You take a filament of flax—Russian flax is, I believe, the best—and you tie this firmly round one of the hinder legs, the longest by which the creature leaps. At the other end of the filament fix an atom of card, sufficient to prevent the flea hopping more than a certain height. This you can increase or modify into tiny coaches, &c., and bind the little coachman, whip in tiny claw with flax, and you can gradually *get out of it* certain antics and human-like exhibitions.

They get benumbed with cold, fatigued, sleepy like any human being, and the exhibitors of the industrious fleas have to gently warm and rouse them with the friction of a warm camel's-hair brush, when he desires them to show off. Indeed, were fleas suddenly to be magnified to the size of dogs or horses, we should not permit the cruelty to exist

that is daily exercised upon them A horse falling dead-lame, dropping down exhausted, and preferring the kick of the British workman, or the lash rather than stir a foot more without one short pause, is not, to me, a more piteous spectacle than the over-worn industrious flea.

For, studying them under a first-class microscope, a shining, bronze plated flea has appeared to me something more than a mere odiously-irritating insect.

As regards the next point—the breeding of fleas. The female of the *pulex irritans* lays about eight eggs. These are laid according to circumstances—of which more hereafter—either all at one time or at irregular intervals.

On examining the bottom of a tumbler of water in which a flea has been immersed, or struggling on the surface all night, eggs, from 4 to 8 in number, can constantly be seen, which are white, oblong, nearly cylindrical, equally rounded at each end, pellucid and irridescent. Under a low power of the microscope they look like opals, and are dotted all over.

The eggs will never come to maturity if laid as above described, in water. But they are constantly found in the test-tubes when the creatures have been well fed and kept in captivity. Indeed, those who are accustomed to observe minute objects with the naked eye, have gradually the organs of vision trained to a most marvellous extent, and their eyes can see the minutest details and peculiarities in some object, where the untrained eye has been totally unable to perceive that there was present any object whatever. I well remember one winter I spent in Genoa, when, at a crowded midnight mass in the cathedral, fatigued with the heat, the service, and the crowd from which I could not escape, I solaced myself and beguiled the weary hours by a minute study of the brown hood of a capuchin friar. There at once was a menagerie! A whole zoologic entomological gardens!

Vowed to dirt and poverty, there was feeding and nesting ground! One could clearly see groups of orphaned eggs of *pulex irritans*, *etcetera*, and, minute as they were, I could clearly see their next stage of active life.

After a few days, in a warm place, or temperate climate, there emerges from each egg a nearly colourless, transparent, whitish caterpillar, without any legs, and covered with hairs. This tiny creature,

about the tenth or fifteenth of an inch in length, is incessantly active when it is in a warm temperature.

Cold benumbs it, and kills it ultimately. What it lives upon has been variously stated or surmised. Probably at first upon the drop of blood, &c., left by the parent flea near it. After that is, as yet, somewhat uncertain. The little active white caterpillar seems eager to find any corner in which to creep, and will fiercely try to bite away in atoms the edges of any card-board or paper box in order to effect its purpose, and if it cannot do so it shrivels up and dies. It will live from twelve days to three weeks; sometimes seemingly dead, but reviving to full active life if warmth be applied to the tube or box. The next stage is of course the spinning for itself a delicate minute brown silky cocoon, from which, according to the climate and temperature that may prevail, the tiny perfect flea will emerge in a few weeks or months.

The above remarks refer only and solely to the *pulex irritans*, or human parasite. There are as many species of flea as there are animals on which flea-parasites are found.

The bat, the mole, and the mouse has each its flea-comrade, and if slight differences according to the apparent needs of the parasite on its hairy, or feathery, or fluffy patron may be conveniently taken to constitute a true species, then there are hundreds of species of *pulex*.

As to killing fleas, that is a less easy affair than to catch them.

S. M.

(To be continued).

WROUGHT FLINT INPLEMENTS FOUND AT WEST WICKHAM, KENT.

Plate IV.

THESE three specimens of wrought-flint implements, figs. 1, 2 and 3, although differing from those figured on Pl. III., have in all probability been used like them as spear or javelin heads. The character of the workmanship of these implements differs from that of figs. 1 and 2, Pl. III., in the surface on one side

Fig 1.

Fig 2.

Fig 3.

Neolithic flint implements found at West Wickham, Kent.

Spear heads (actual size).

being flaked from one point (see figs. 1 and 3, Pl. IV.), and in the other side presenting a flat surface owing to its having been struck off the original core in its present form.

The other spear-heads (Pl. III.), as will be seen by a glance, have been brought to their present shape by carefully chipping the flints *at the thin edges* on *both* sides.

Fig. 2, Pl. IV., may, however, be regarded as an exception to the type represented by figs. 1 and 3, as it has been formed by a variety of blows, dealt from various directions, but it cannot be considered as a separate type, as it resembles them in having been allowed to remain in precisely the same form as when originally struck from the core. It is a beautiful specimen, and in perfect condition. GEO. CLINCH.

SOCIETIES' MEETINGS.

WEST LONDON SCIENTIFIC ASSOCIATION.—December 14: Paper by Dr. Gladstone, on "Shooting Stars and Meteors."—The lecturer gave an interesting account of these natural phenomena, with the dates of their chief appearances—notably that of the great meteoric shower of 1866; together with famous displays of older date. The composition of the meteoric stones which fall upon our globe, was next discussed, in which iron was shown to play an important part; this metal being present in a condition which is known as *metallic* iron, and which is never met with in the terrestrial metal. The *colours* of shooting stars were shown to be extremely variable, and little or no dependence could be placed upon the statements of eye-witnesses with regard to this point, on account of the great rapidity with which they pass across the line of vision (viz., at the rate of 40 miles per second). Blue, however, seemed to be a prevailing colour, but inasmuch as an extremely bright tint would appear to us to be *white*, as would also a very dull tint, it was impossible to say what other colours might or might not be present also. By means of an instrument which was exhibited, and which consisted of a spectroscope in the form of a stereoscope, the gases of a passing meteorite were split up into their respective and representative colours. The several theories which have been advanced to account for the presence of meteoric stones, were

enumerated by the lecturer. The first of these was to the effect that they were fragments of rock which had been ejected from volcanoes on our globe; (2nd and 3rd) that they were thrown out by the volcanoes of the moon or sun, and falling within the attraction of our earth, were cast upon its surface; (4th) that they originally formed part of the great nebular mass out of which our planet is supposed to have been evolved; and (5th) that they came from regions of space outside our Solar System altogether.

NOTES AND QUERIES.

THE WEATHER.—I presume that readers of "Natural History Notes" need hardly to be informed that the weather during the months of October, November, and during the greater part at least of December, 1880, has been of a very unusual kind. But I must ask their forgiveness in reminding them of the fact, as there are one or two matters in connection therewith to which I should like to refer. It will be remembered that the heavy fall of snow, which commenced on October 20th, occurred before the foliage had fallen off the trees, and that, owing to the larger than ordinary amount of surface thus presented, many boughs and large limbs of trees were broken down by the immense weight of the snow. The effects of this may still be seen in the great number of partly broken branches still hanging from the skeleton trees and swaying to and fro in the wind, and also in the vast quantity of large boughs, &c., which may still be seen lying under the trees in parks, etc., in all directions. This shows very clearly the reason why most of the trees are annually divested of their leaves during the winter months, and is another instance of the wonderful way in which everything has been made suitable to the conditions in which it is placed. What immense damage would be done to trees if they retained all their leaves during the snow-storms of a whole winter?

During the exceptionally mild weather of the first part of December, when the days were drawing towards their close and the sun was sinking in the golden west, I have been delighted to hear the note of the blackbird, as clear and as sweet as may be heard in spring.

By the newspaper, I see that primroses are already making their appearance in Sussex, owing to the unusually mild temperature. G. C.

EXCHANGE COLUMN.

The fee for insertions in this column, is at the rate of 1d. per line.

COMMUNICATIONS for the Editor should be addressed FRANK J. ROWBOTHAM, 42, Loftus Road, Shepherd's Bush, London, W.

The Editor of "Natural History Notes" is open to engagements for teaching Geology, Physical Geography and Rudimentary Botany, at his own, or pupils, residence. Also for classes. Terms moderate. 42, Loftus Road, Shepherd's Bush, London, W.

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FLEAS AND FLEA-POISONS.

(Concluded from Page 6.)

INDEED, all insects "take a deal o' killing." If a flea be left floating on the surface of a cup or basin of water, it will live eight-and-forty hours or more, and eventually dies of starvation and exhaustion. If it be left immersed at the very bottom of a tumbler of water from twelve to fifteen hours, it will in all probability revive in a dry box, or in the sunshine, or in any moderately warm temperature. A flea will live from three to five days in a tube or dry box without food; but after that period it is too weak to pierce the skin to obtain food, and cannot take it in any other way; it will not, or cannot, suck up its food unless it gets it in the natural manner. I speak from experience, having brought up many *by hand*. If a flea has recovered, or is recovering from prolonged immersion in water, it is best to place it in a glass cell, and cover it with a piece of glass fixed temporarily but firmly on the top of it, and observe, under a low power of the microscope, the gradual recovery.

This begins from the interior, of course. In the intestines and stomach, movement—peristaltic action—is seen slowly to re-commence, and the dark red fluid (its own blood, or mine?) begins regularly to surge backwards and forwards, and a trembling motion begins in all the joints of the tarsi; *trembling* and a gradual and *natural* movement of the small two-pointed extremities of the tarsi. Mark, I do not say a *convulsive* motion; for of this, on treating of flea-poisons, I shall speak more presently. The creature gradually and entirely recovers, and frequently before taking food will lay the five to eight eggs as if nothing had happened.

Finally, as to killing fleas. The ordinary method of killing a flea is horribly cruel, and were the creature suddenly and visibly to all passers by, to become magnified to the size of a horse, and subjected publicly to that death, down would come the Society for the Prevention of Cruelty to Animals, and the one who had so killed the monster would be punished. Imagine a huge millstone descending on a horse in the public highway, or on a dog or cat even, and half crushing either creature, leaving it for hours to die—lying half-killed and disembowelled and in fearful agony. Yet this is the death constantly inflicted on a tiny creature *with a highly developed nerve-system;* and I have continually found the flea so half-killed, *ten* hours afterwards, still writhing in agony. Even decapitation, the next most summary and merciful death, is not always successful, and the head and thorax, with some of the vital organs and all the legs attached to them, will be seen feebly moving for three or four hours subsequently.

Mind you, I do not approve of the provoking vitality of insects. It is as difficult to convince an insect that it is truly dead as an Englishman that he is beaten in battle. Both belong to the never-*say*-die association. Of this more on some future occasion. I only urge mercy even to the smallest creatures, and think that a flea should be killed as we say a man is to be hanged by the neck "*until he be dead.*"

There are, however, "extenuating circumstances" to be urged in favour of those who, disturbed and maddened by the bites of the *Pulex irritans* when on their travels, have recourse to flea-bane, or insect-powder. My attention was first called to the singular effects of these powders when residing in Naples. Tortured beyond the most saintly powers of endurance, I purchased at an apothecary's in the Strada di Chiaja, advised thereto by my Neapolitan Padrona, a cylindrical box of Parlander's Polvere per i Pulci. It was yellow in colour, and of a pungent odour. Procuring at once—and easily—twenty or more fleas, I put them right into the box and smothered them in the powder for half-a-minute. By that time, although still alive, they were not capable of springing to the height of more than half-an-inch, and were soon dead, and, as I then noticed, were swollen but retained their usual colour. This I have since found to be invariably the case when they are covered or smothered with the powder. But soon I remarked a curious phenomenon.

In Rome and Naples where the *Pulex*, or dust-insect, necessarily prevails, I adopted several plans for the best use of the powder, such as hanging a blanket over the foot of the bed, and sprinkling two lines of powder along the top of the rail thus covered, and along the foot of the bed where I allowed a small length of the blanket to rest. I also when disturbed by the enemy, lazily put a pinch of the powder in my sleeve, and sprinkled the sheets with it. In the morning I fiendishly and joyfully piled up the corpses I found, as the Ninevites are seen piling and counting the heads of the captives in the sculptures at the British and other museums. But as a rule few were quite dead, and I noticed that all were absolutely *flat*, not swollen in the least, and of a *light yellow* colour. I then examined them under the microscope, and noticed that the flatness was to be attributed to the fact that they were absolutely empty! Not a trace of food, digested or undigested, could be seen. What had happened? I placed a couple of fleas, male and female, alive and friskey, between two pieces of glass, and with a low power of the microscope watched their movements—simple, natural and vigorous struggles to escape, and they were so strong as to shift the glass and nearly succeed in their endeavours. I next surrounded the edges of their prison with a sprinkling of the powder, not allowing one grain of it to come in actual contact with them; for I felt sure that when covered with the powder they died a rapid and a double death—that of poisoning by the odour of it, and also by reason of their spiracles being choked up with the powder itself, and thus all breathing was hindered, as any powder will hinder it, as well as oils which spread in thin films over them. In a moment, when the sides of the loose piece of glass were stopped by the powder, I saw, and have since seen and shown many times, the sudden and convulsive contractions of the alimentary canal and cylindrical-shaped stomach, while the regular peristaltic action instantly ceased; that is to say, the contents of the stomach instead of surging rhythmically backwards and forwards, rarely moved, and then only with a convulsive jerk towards the end nearest the thorax, while tiniest molecules of blood slowly exuded from the creature. The female on this and several other occasions thus treated, laid in rapid succession the eight eggs, which remained attached by their filmy membranes endways to each other. The little creatures

made no attempt at escape, they merely lay convulsed and bleeding.

What was the powder? On examining the powder under a high power of the microscope I found it to consist of fragments of the leaves, corolla, and pollen, of the common *Pulicaria dysenterica.* Then the flea was actually dying of bleeding dysentery! And this is the case, and accounts for the flattened empty body and pale colour when dead. But what about the name given to the plant? It is asserted by Linnæus that this plant cured the Russian army under General Keith of dysentery ("Macgillwray's Withering," 1852), but the plant had its name long before that event, surely. What made the Russian army have the happy thought of trying this remedy? How is it that it is not to this day a specific for that complaint? Was the specific name so curiously associated with the *Pulex* quite by chance—or as magnifying-glasses, water-globes, &c., have been known for ages, so may not this curious effect on the flea have been found out by some old herbalist or "medicine-man," and have led to the name being given to plant, and also to the Russian army trying it as a medicine? Many plants and herbs were used on account of their names, which, indeed, had often been bestowed on them by some observant and cunning herbalist, old would-be wizard, or medicine-man, on account of certain resemblances or external peculiarities; such were the navel-wort, liver-wort, louse-wort, etc. Have the Homeopathists anything to say to it? Something that produces a disease *similar* to bleeding dysentery in a flea, used as a medicine by the Russians! Or is the Russian story a fiction? Were the men any the better,—really cured by that plant? Or was it not named, as I suspect, from its curious effect on the *Pulex irritans*, the *Pulicaria dysenterica?* For, while many plants have the name of *Pulicaria* and flea-bane, none of them produce on the insect the effect I have described. Some powders sold as insect-powder I have found utterly useless, and on examining them have found them either of another species, or they have been dried to blackness and so have possibly lost their poisonous odour. I have found the "real original" simple powder of *Pulicaria dysenterica* at a chemist's (James Garner) in High Street, Kensington, which had the same curious effect as those with which I experimented in Rome and Naples.

S. M.

SOME OBSERVATIONS ON "SANDPIPES."

All geologists of any experience in chalk districts will recognize in the term "sandpipes," a curious phenomenon which is by no means rarely met with in the sides of many a chalk-pit But as among the readers of this article there may be some who have not had an opportunity of examining an instance of a sandpipe, it will be well for me to give a brief description of them before making any observation as to the probable cause.

Sandpipes, as they are termed, are certain column-like patches of sand, gravel, etc., which, reaching from the surface of the ground, extend downwards through the chalk cliff in a perpendicular direction, and may be from a few inches to several feet in length. It will also be observed that the thickness of the column gradually diminishes towards its lower end, and if the extremity be visible it will generally be found to end in more or less of a pointed form. The "pipe," or columnar body, is generally composed of matter similar to that which overlies the chalk. Upon a close examination of the construction of the pipe it will be found that clay or clayey matter is more abundant at the outer part of the pipe than towards the middle. Another noticeable feature of some interest is to be found in the fact that the surfaces of chalk-flints (if any exist in the pipe) bear no marks of attrition, nor is there any change in the outward appearance of the flint nodules, except that caused in the colour by the iron, etc., which may exist in the sand or clay in which they are imbedded.

Sir Charles Lyell, in his "Elementary Geology," gives a concise account of "sandpipes," in which he tells us that the great agent in the formation of these pipes is "water charged with carbonic-acid, derived from the vegetable soil and the decaying roots of trees." This appears to me to be as near the true explanation as possible, and any remarks of mine on that subject after the quotation of such an authority as the above would not only be misplaced but quite unnecessary. It is highly probable that the first step towards the formation of a pipe was the piercing, by the root of a tree, of the bed of clay which one usually meets with just above the chalk. This root then following the course of a fissure in the chalk, would, after it had become rotten, leave a narrow tube-like cavity, into which the moisture would find its way,

bringing with it a small part of the sand, gravel, or clay. This water would, as Sir Charles Lyell remarks, readily find an exit into the porous chalk. Thus, by means of the water charged with carbonic acid, the chalkey walls of the pipe might be gradually widened, and the dissolved chalk would be carried downwards into the chalk rock.

Sir Charles Lyell further tells us that the clay which, as I have already said, is generally to be found on the outside of the pipe, was probably derived from the chalk, hence its position at that point where the waste of chalk has principally occurred. May I venture to suggest that this clay might have been brought down from the top of the chalk by the water running into the pipe? And that the chalk, acting as a kind of filter, would probably cause the clay which was held in suspension by the water, to accumulate where the water entered the chalk. This would, I think, account for the absence of clay in the central part of the pipe as well as its abundance on the outside, where the quantity which exists seems to me too great to have been all derived from the chalk.

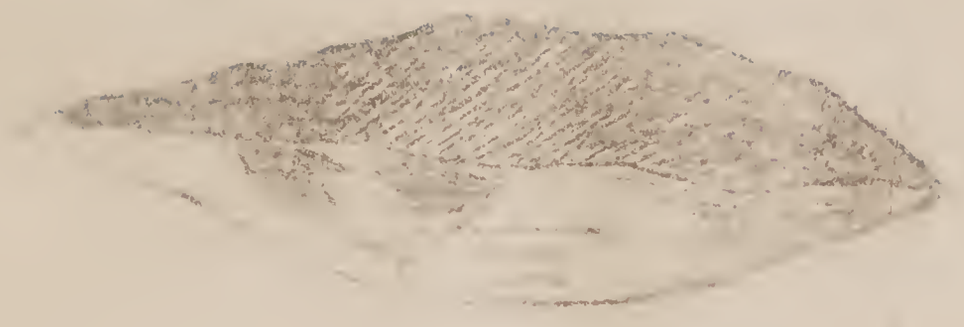
The subject of sandpipes is one of considerable interest, and I should be glad to see, in these pages, any communication or remarks which any reader of this paper may think fit to make.

GEO. CLINCH.

WROUGHT FLINT IMPLEMENTS FOUND AT WEST WICKHAM, KENT.

Plate V.

THE flint here represented is a fine specimen of a Palæolithic tool, belonging to a class of flint implements known among antiquaries by the name of "Ovoid-flints." This particular implement, although probably belonging to a period coeval with the river-gravel and "drift" implements, was found upon the surface of the ground associated with a quantity of flint implements of a Neolithic type. The reason why this flint should occur in such an apparently strange position is not perhaps difficult to explain, as it may have been lost near to the place where I had the fortune to find it by some man in Palæolithic times. The exact use to which ovoid-flints were applied is a subject upon which many



people differ. It is probable that they were used somewhat as a scraper.* It is not generally supposed that they were fixed in handles, although from the form of this specimen it seems quite possible that it may have been used in the same manner, and for the same purposes as a celt.

The method by which this flint has been brought to its present form is, as will be observed, by a succession of irregular blows, all of which have been dealt from the edge. Although the manner of working is extremely simple, yet so successful has been every blow in bringing off the desired portions or splinters of flint, and so beautifully has the implement been finally shaped, that no one can for a moment doubt that we have here a specimen of the work of a hand well used to and experienced in the art of flint-chipping.

It should be added that the surface of the flint has been well whitened through exposure, etc., during the immense period which has elapsed since its manufacture.

GEO. CLINCH.

SOCIETIES' MEETINGS.

WEST LONDON SCIENTIFIC ASSOCIATION.—Jan. 11 : Paper by B. B. Woodward, Esq., F.G.S., F.R.M.S., on "The English Crags." Commencing with a general description of the appearance presented by these crags, and enumerating the fossils, etc., peculiar to each, the lecturer gave a summary of the conditions under which they were respectively deposited.

Towards the close of the Miocene period a depression took place over the area now occupied in great part by the German Ocean, and in the sea thus formed the crag-beds were thrown down ; first, those near Antwerp, and then the ridge of Coralline Crag. The temperature of the water was favourable to the growth of more southern forms of mollusca than now dwell on the spot, and the sea was probably more open to the south ; but in the springtime the ice floated down from the north, bearing with it boulders of foreign rocks, which, on melting, it dropped to the bottom. Then by slow degrees, the land rose again to the south, the sea extended to the north, letting in more cold water, and the ridge of Coralline Crag approached the surface. To the south of this bank

* We hope to give some figures of scrapers in a future number.

the now shallow sea piled up the shells of the colder Red Crag period; whilst on the northern side, in the sandy bays of an estuary, or collection of estuaries, the Fluvio-Marine Crag was forming. But once more the sea claimed its own, and with temperature yet further lowered, crept southward, spreading out the Chillesford sands and clays over the other deposits. Finally, a further depression ensued, ushering in the prolonged glacial epoch with its attendant phenomena.

NOTES AND QUERIES.

EFFECTS OF THE MILD WINTER.—As signs of the mildness experienced at the commencement of the present winter, may be noticed the fact that the yellow-flowered Winter Jessamine is in full blossom round about Acton, Ealing and Hanwell, Middlesex; and also the comparative rareness of starlings. It was only the other day that I heard the first pair piping. B. B. W.

Dec. 27, 1880.

ON Dec. 28, 1880, violets were in flower in an exposed garden.

A.P.

SEVERAL remarkable instances of the effects produced by the mild weather we are at present (Dec. 1880) experiencing, have occurred in our garden at Epsom. A great many dasies, together with a buttercup and dandelion, are in full blossom on our tennis-lawn. Besides these wild-flowers, in the garden primroses and violets are blossoming, whilst the heads of the crocuses are already protruding from the ground. Several stocks, also, which bloom usually in the autumn, are still in full flower, thus curiously mingling autumn with spring forms. W. A. P.

EXCHANGE COLUMN.

The fee for insertions in this column, is at the rate of 1d. per line.

Communications for the Editor should be addressed FRANK J. ROWBOTHAM, 42, Loftus Road, Shepherd's Bush, London, W., and should reach him not later than the 15th of each month.

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SECOND SERIES. MONTHLY. VOL. I., NO. 3.

Natural History Notes.

EDITED BY

FRANK J. ROWBOTHAM.

MARCH, 1881.

THE PHYSIOLOGICAL UNITY OF PLANTS & ANIMALS.*

As knowledge advances, phenomena once looked upon as isolated are brought under the domain of general laws. Thus the old three kingdoms of nature are now known to be in some respects one; in no essentials more than two. The organic world contains no peculiar chemical elements: many of its compounds have been built up in the laboratory: it is subject to the same chemical laws as, and exhibits electric phenomena comparable to those of, the inorganic. Rudimentary structure presents a close relation to crystallization, and it is difficult to demonstrate the existence in Life itself of anything different in kind from the energies of inorganic matter. The term "organism" is inapplicable to the lowest plants and animals — those undifferentiated beings which Häeckel has classed as the kingdom *Protista.*

Alike in the animal and vegetable kingdoms so-called, we have a limited number of elements in any considerable proportion, viz.: carbon, hydrogen, oxygen, nitrogen, phosphorus, sulphur, iron and potassium. Many of the proximate constituents of plants and animals are either alike or are closely analogous, such as water, starch, sugars, cellulose, fibrin, gluten, casein, albumen, and chlorophyll; and the object of the lecture was to show that organisms which we are compelled to class apart as plants and animals have the same functions and perform them in a closely similar manner.

The complex compounds of which an organism is built up are in unstable equilibrium, constantly tending to break up into such simpler and more stable compounds as water, carbonic acid, and ammonia. To repair this constant waste the necessity of the function of Nutrition is co-

* Abstract of a lecture delivered before the Sunday Lecture Society, January 30th, 1881, by Professor G. S. Boulger, F.L.S., F.G.S.

extensive with the existence of life. Food has to be taken in, rendered soluble, assimilated or re-compounded into the required tissue-forming substances and conveyed throughout the body to every part. In these processes of waste and repair oxygen is required, and carbonic acid is disengaged; hence the function of Respiration. In order to obtain food and to protect itself from enemies an organism advantageously acquires organs of Relation, including the sensory and motor organs, and that nervous system by which the two are brought into connection. The nutrition of an immature organism produces growth; but when a certain stage of development has been reached, this growth becomes discontinuous, in other words reproductive processes commence. These may be divided into the three cases of fission, gemmation, and ovulation, the latter following a process of impregnation.

In their nutrition, most of the higher plants differ considerably from the majority of animals. Fixed in one spot, they take in water and saline matters by their roots from the soil, and gaseous matter, especially carbonic acid, from the air by their leaves. This poisonously unrespirable gas in the presence of light is decomposed and its carbon utilized in the formation of starch ($C_6H_{10}O_5$), in proximity to the green colouring substance chlorophyll. This chlorophyll is absent in the Fungi, which consequently contain no starch, and is inactive and all but absent in many parasitic flowering plants. On the other hand, it occurs in about a score of animals belonging to widely divergent groups, and has been shown to have the same action on carbonic acid. Starch also has been found in animal tissues. Similarly, a small number of flowering plants, belonging to widely divergent groups, have acquired the leading characteristics of animal nutrition. [Models of these plants were exhibited]. The root-system is reduced; the secretory glands of their leaves acquire an absorptive function; an acid, similar to those produced within the plant in the processes of metastasis, is excreted to aid in the digestion of animal or other nitrogenous matter; the peptones produced are absorbed; and various special contrivances subsidiary to these processes are evolved. Thus in *Nepenthes* the food is ingested into a glandular pitcher, or stomach, containing acidulated water, in which peptones have been afterwards detected; in *Drosera* we have a viscid, acid secretion, in which a ferment analogous to pepsin has been discovered, and a co-ordinated

movement of parts distant from the point excited, which suggests a function of the protoplasm of the leaf-cells resembling nerve-action; and in *Dionæa* we have an electro-magnetic current producing rapid movement analogous to that action of the most elaborate organ of special sense in the animal — the eye — which Professors McKendrick and Dewar have recently investigated, under the electro-magnetic stimulus of light. Under the influence of warmth and moisture, and probably always in presence of a ferment, starch is converted into sugar ($C_6H_{12}O_6$) in germinating seeds, sprouting bulbs or tubers, and the stems of trees.

Thus we have represented in the plant each leading process in animal digestion: the conversion of starch by the warmth, moisture and ptyalin of the saliva; and ingestion into the stomach, the glands of which secrete the acid gastric juice and pepsin digesting, or dissolving, albuminoid substan es, so that they may be absorbed as peptones.

The function of Respiration in plants, though in most cases masked during the day by the action of chlorophyll, is the same as in animals; as can be seen in germinating seeds, in flowering, in leaves during the night and under the influence of anæsthetics, when nutrition ceases. Of course, however, the more powerful action of chlorophyll renders the total effect of green plants on the air the converse of that of animals.

The functions of Relation are only seen in their most generalised form in the vegetable word. We can, perhaps, hardly claim the Sensitive plant as a true case of sensation; but the movements of *Drosera* and *Dionæa* are remarkably animal in character; whilst as it is impossible to draw any structural line of demarcation between the lowest plants and the lowest animals, so in both we have movement by pseudopodia and by cilia.

Their resemblance in their simple methods of reproduction by fission and gemmation is also striking; but not nearly so much so as that between the higher, sexual method of ovulation in the higher *Thallophytes* and the same method in animals. Here the male element in both cases is a closely similar spermatozoid, and the female a unicellular ovum formed by a process of free-cell formation and becoming segmented after impregnation. From this close identity throughout, it would seem that even the highest of the animals may be benefited by the study of vegetable physiology.

G. S. B

VITALITY OF INSECTS.

Dead or Alive—"That is the Question."

I have elsewhere complained of the perversity of insects, as shown in their never knowing when they are dead. They not only never say die, but so utterly ignore the fact that the student is continually much inconvenienced by the action and behaviour of some insects, the *works* of which he wishes to investigate. Wishing to bow before the wise dictates of that most sapient class which has joined the Antivivisection Society, I simply "want to know, you know," how a fellow is to judge when he may begin to operate on a fellow, if that fellow will not behave with calm dignity, knowing as he must do that he is positively dead. It is immensely confusing, and agitating too, in the present enlightened state of society.

Decapitate a blue bottle and he behaves like Orillo, the headless giant in Ariosto, who went *brancolando* after his missing head. Among the curious sayings of the observant country people, is one which declares that if you leave a headless insect alone it will not die before the dawn. The upper half of a wasp will walk on, attacking all it meets, and behaving, even in the matter of food, exactly like the famous horse of Baron Manchausen, who went on drinking so prodigiously that the Baron on turning his head to see if anything could account for the phenomenon, found that the latter half of his horse had been cut away, and that as he drank the water flowed freely away; and in the case of one very obstinate insect I know, I want to be informed if my conduct was cruel, or if the creature was not vexatiously blameable. This is what did and does continually occur with the great green locust so common in Italy. The creatures are called *cavalletti*, or little horses, from the curious resemblance to a horse one remarks in the head. There is a verse in Revelations, chap. ix., that mentions locusts, "and the shapes of the locusts were like unto horses," &c., &c. Such is the shape of the head of the insect in question. On more than one occasion I found several of these monsters staring at me as I lay in bed in Italy. In fact that is the sort of pleasure to be looked for in "the land of dance and song." I was studying the nervous system of the gryllus, and so caught one, and quickly beheaded it. There on the neck end stood the head upon the table, and jibbered at me for hours,

all the while turning round on its neck against all the known laws of common sense! The headless body groped in the *brancolado* style after its head, and then flew out of my hand "all over the place."

"Only muscular," said I, to comfort myself, and after catching the creature and studying the wings and mode of attachment, I cut off the wings. It hopped away and leaped about the room in all directions. I then studied and cut off the hoppers; the creature, headless, wingless, and reduced to four legs, walked about the table, and the head contemplated his missing links and continued to jibber. Then I, with my dissecting knife, opened the creature from top to tail, took out all his "works," arranged them on separate glasses for the microscope; took out the ovary, containing thirty-one large eggs, or cases of eggs, each case the twelfth of an inch in length; and all this time the creature, an empty, shining horny case, with its own head on the table (*tête montée*), persisted in walking about.

"Will nothing convince that creature it is no longer an individual, but is only a specimen?" So musing, I took a little cotton wool, and carefully stuffed the *specimen*, which for all that crawled for hours on the table. After this I cut it into four pieces, a leg to each of the portions of shiny, horny segments, and at dawn each leg was entering its protest against owning it was dead by quivering at intervals.

I feel uneasy on the subject, and even my grammar grows confused as I meditate on this possible "incomplete differentiation," and I do not know whether to speak of an insect as *it* or *they*. Which is its individuality? Is it "in the heart or in the head?" I allow myself the benefit of the doubt, and hope it is really only in the head, because a small amount of chloroform held on a piece of cotton wool to the mouth would almost instantaneously have killed it; but then the whole body would not have been in so excellent a condition for examination.

I can only assert that "these be facts," desiring to know whether my *subject* was dead or alive. S. M.

MEANS AND METHODS OF OBSERVATION.

In giving a summary of the various ways and methods by which observations upon natural objects can best and easily be made, it is necessary at first to consider briefly what is required of the observer

himself. To commence with, any enquiries which he may desire to prosecute, whether they relate to Zoology, Botany, Entomology, Geology, or any other of the numerous branches into which science is divided, should be undertaken by him with a spirit of earnestness befitting the importance of those studies. In science, as in everything else connected with this work-day world, sound reasoning deduced from carefully investigated "facts," is what is absolutely required. Let the reasoning be ever so theoretical, provided it be confined within the boundary of common-sense, and deduced from a sound basis of careful investigation, it will receive its due apportionment of value amongst scientific men.

The aim and desire of every intending observer should undoubtedly be to seek to confirm, where practicable, the assertions contained in the works he has studied, by means of self-observation instituted with an earnest desire for Truth. By so doing he enrolls himself upon the list of scientific-workers. He, so to speak, as student, *checks* the observations of his masters, and it would be needless to tell how few of such checks are not required — nay, *desired* also,—upon the calculations and observations of others. The "whole duty of (the scientific) man" may thus be briefly stated in a few words—To Observe : and to record Facts.

As to means and methods of observation, they are various, and will be readily understood to depend in great part upon the character of the observations intended to be undertaken. Should these relate to Botany, it will be found extremely useful to select for examination a prescribed area, and to note down the number of species and varieties of plants found within the precincts of such area ; to what order, or orders, they respectively belong : the abundance, or scarcity, of individuals comprised in each species, not forgetting the conditions of atmosphere, soil, &c., under which they may be living. Also to record any malformations or other change in the usual character, which may result from any particular state of the soil, &c. It is also necessary, as well as useful, to carefully preserve and name individuals from each species ; and lastly to take care and note which particular species, if any, predominates above the rest, for this ranks as an important fact in the great struggle for existence and survival of the fittest.

Subsequent comparison of a list of plants occurring within a limited area, as above indicated, with that drawn up from a neighbouring area, or areas, will be found a sure guide to the general distribution of individual species of plants over a large surface of ground, or even over an entire county ; whilst the record of changes in character will afford instructive evidence of the effects produced on plants by differences of soil and other conditions of growth.

In studying the ranges and habits of various members of the animal kingdom, the hints briefly offered in the above remarks relating to Botany will be found to apply in like manner to this branch of science, with the exception that in the case of Zoology, the limitations of the

prescribed area must necessarily be of a *natural*, and not *artificial*, character; as it would be obviously impossible to fix artificial limits to any area in which it is desired to observe animated beings, on account of its liability to encroachment by animals migrating from outer areas, and which could not be properly described as *resident* species. Thus it is rendered necessary to seek an area which shall be bounded by natural limits. Heaths and woods may be taken as examples of such areas, whilst islands, as is well known, by reason of their watery surroundings, furnish remarkably interesting areas for study. As an instance of an area bounded by natural limits, and the animals, plants, and insects inhabiting which have been described, may be mentioned the Warren, which stretches below the cliffs from Folkestone to the Abbott's Cliff, near Dover—a spot well known to workers in the Gault formation.

It is needless to say, perhaps, that in studying Entomology the same rules with respect to area-limitations as those applying to Zoology would have to be observed.

With regard to Geology, it is unnecessary to say much here, except to recommend to the student, in the first place, that he should endeavour to learn the geology, and physical geography also, of the district in which he resides, and to make copies of such sections as he may meet with in the course of his rambles; secondly, to take no one man's reading of a section for actual truth, until he has verified it by personal observation, or, if this be impossible, and where the reading of the section be in dispute, to hold over his opinion, weighing meantime the evidence on both sides; and thirdly, to use his utmost endeavours to connect by geological sequence the series of events which have taken place on the earth's surface at various periods in its history, and which may be indicated by the presence, or on the other hand by the absence, of fossil remains,—making due allowance in endeavouring to connect the fossils of one group of rocks with the next above, for any blanks which present themselves, and which may be ascribed in many instances to the erosion and complete removal of the intermediate beds, containing the missing link-forms, before the formation occurring next above was deposited.

That the idea of applying the sciences of Zoology, Botany, &c., to the working out of various districts has been found by many to be a most sure guide to obtaining information as to the general distribution and character of plants and animals, and that it is fast gaining ground amongst earnest students, is rendered certain by the number of lists such as have been indicated which are sent to the scientific Journals for publication. There is not a scrap, a miserable starved-looking parcel of "waste" ground (even such as may be met with in abundance on the outskirts of the metropolis) but would yield a list of most interesting, perhaps in some instances rare, plants, were there a student willing to take upon himself the trouble of working out the flora of such an area.

SOCIETIES' MEETINGS.

HIGHBURY MICROSCOPICAL AND SCIENTIFIC SOCIETY.—March 5.—Excursion to the British Museum, South Kensington. Director, Dr. H. Woodward, F.R.S.—March 10.—Meeting at Rev. W. M. Statham's, 169, Highbury New Park. Paper by Mr. R. Moreland, M.I.C.E., on the "Ear."—March 24.—Meeting at Dr. Alabone's, 175, Highbury New Park. Conversational.

NOTES AND QUERIES.

HAWFINCHES.—The late extremely severe weather killed a number of the small birds, and especially the finches, in consequence of the short supply of berries they found very little to feed upon. A fine specimen of a Hawfinch *(Coccothraustes vulgaris)* was found nearly dead from cold at Virginia Water, on January 21st, and another at Hull. They are naturally very shy birds, but during the wintry weather they become very much tamer. S. S.

ORIGIN OF SPECIES.—I am sure most of your readers are acquainted with the hypothesis of "Origin of Species by Natural Selection." So far as I understand, what is called "Natural Selection" operates in this way. The environment of the individual species tends to develope those characteristics which are best adapted to its struggle for existence. I have seen lately a rather good argument against the application of this theory, at least so far as the human species is concerned. If the theory be universal in its application, we should expect to find the *genus homo* supplied with a respectable covering of hair, instead of resorting, as they do, to supplies from the stores of Art. The argument contests that no more strongly marked characteristic could have been brought about by the surroundings. Perhaps some of your readers may be able to give me a reply to this point, as I have not yet seen one.

J. O.

AURORA BOREALIS.—I had the pleasure of seeing a fine display of the Aurora Borealis on the evening of January 31st. I first noticed the brilliant appearance of the northern sky at about 6.45 p.m., and several flashes followed at short intervals for the space of about half-an-hour, or a little more. Quickly after the brightest flashes, the sky, especially in the N.W. part, became of a red colour, which, after continuing for the space of about a minute, gradually died away again. I noticed this several different times. GEO. CLINCH.

FIELDFARES.—I was informed this morning that Fieldfares had been seen feeding off berries on the trees in Abbey Road, St. John's Wood. These birds, as is well known, very rarely come "to town."

January 18th, 1881. B.B.W.

QUERY AS TO NORTH CONE.—Could you kindly explain to me the meaning of the following, which I have seen occasionally in the daily newspapers. "The *North Cone* was raised in Districts 1, 2, 3, etc." What does the "North Cone" mean? and are there also South, East, and West Cones? CHARLES E. INCE.

"Natural History Notes."

The above Journal, which was started in January, 1880 has for its object the forming of a compendium of Notes on Natural History, gathered from the note-books of students of nature.

The first volume, which is just completed, has been issued in *manuscript* form, but as many of the subscribers have expressed a wish for it to be printed from the 1st January next, it has been decided to do so, provided a sufficient number of subscribers can be obtained to cover the additional expense.

The Editor, therefore, will be glad to receive the names of any persons willing to assist in carrying out the above object.

The annual subscription is 2s. 6d. (inclusive of postage), which sum will entitle the subscriber to receive a copy of the Journal on its issue monthly.

FRANK J. ROWBOTHAM,

Editor.

42, Loftus Road, Shepherd's Bush,

London, W.

SECOND SERIES. MONTHLY. VOL. I., NO. 4.

Natural History Notes.

EDITED BY

FRANK J. ROWBOTHAM.

APRIL, 1881.

NATURAL MAGIC.

ACCORDING to Pliny's showing, natural magic was wholly derived from medicine, the physician of the ancients acting also as the magician. Indeed, the title of magician was only conferred on men who were accredited with superior genius and knowledge. Their process of *curing* diseases consisted of meaningless observances, and were altogether unassociated with what a modern physician would consider his professional duties. In the *Odyssey* we read of a cure performed by a song. Josephus relates that he saw a certain Jew, named Eleazar, draw the devil out of a woman's nostrils by the application of Solomon's seal in the presence of the Emperor Vespasian. In certain cases the physician composed a mysterious prescription, which was applied to the *outside* of the patient, and thus effected a cure ; for instance, *Anazipta*, scrawled upon parchment, cooled the fever, and *Abracadabra* charmed away the ague. Similar superstitions have affected more recent times.

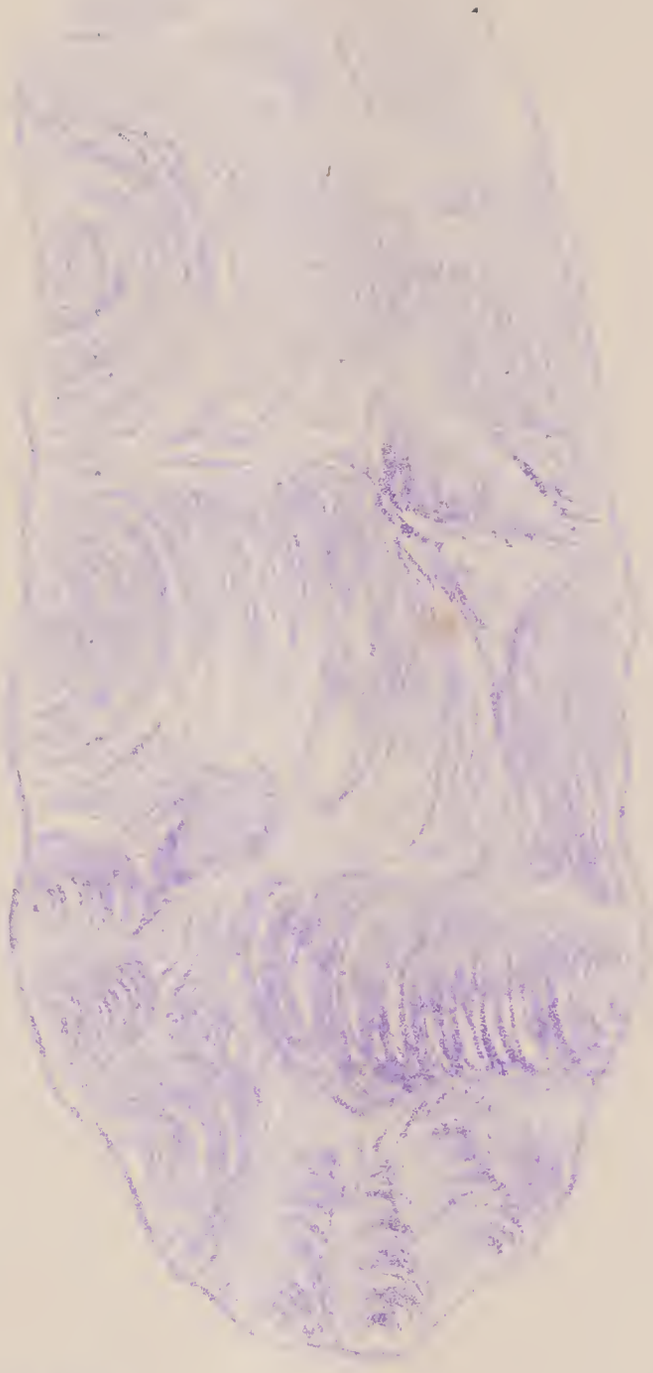
Each plant has been supposed to bear a sign of its own virtues, and, when gathered and applied under certain conditions, to be capable of curing some score of ills that afflict humanity. Thus, Culpepper places the Woody Nightshade (*Amara dulcis*) under the special care of the planet Mercury ; this plant, "being tied about the neck, is one of the admirablest remedies for the vertigo or dizziness in the head." The Adder's-tongue fern, Culpepper asserts, "is an herb under the dominion of the Moon and Cancer, and therefore, if the disease be caused by the evil influence of Saturn in any part of the body governed by the Moon, or under the dominion of Cancer, this herb cures it by sympathy. What parts of the body are under each planet and sign, and also what disease, may be found in my astrological judgment of diseases." The St. John's Wort (*Hypericum androsæmum*) was formerly invested with

properties which counteracted the spells of witches and the baneful effects of the evil eye. The leaves of the Common Alder-tree, "gathered while the morning dew is on them, and brought into a chamber troubled with fleas, will gather them thereunto, which, being suddenly cast out, will rid the chamber of these troublesome bedfellows."

The *elf*, or nightmare, was to be chased away by a more complicated process; selections from Holy Writ were to be inscribed on the sacred patina; in a deathlike quiet a decoction of thyme, valerian, dodder, and fennel was to be infused in water brought by the purest hands from a neighbouring stream, and with this liquid the words were to be washed off the hallowed dish; the mixture was then carried to church, penitential psalms and masses were sung, and the potion administered.

Should the prescribed remedy fail and the patient die, an occurrence probably by no means rare, the mysterious terms employed by the magician sustained his reputation as a physician. His ready wit enabled him to prove beyond a doubt that had his instructions been carried out the sufferer would have recovered. The careless apothecary had plucked the leaf downwards, in the *sextile* of the reigning planet, instead of upwards, and in the *quartile*. The phraseology in which he proved his case was little understood even by himself; it served to mystify his devotees, and kept them in humour with the art he practised.

Such a system of medicine had long held powerful sway. It was not until the seventeenth century that any determined opposition was made to it. Roger Bacon commenced the demolition of this empirical formula, by propagating his doctrine that to preserve health, attention must be paid to food and drink, to the hours of sleep and the exercise of the muscle, to the quality of the air and to the affections of the mind. He resolved to accept nothing in the domain of physical science that could not be clearly demonstrated by experiment. He "unlocked the secrets of art and nature," and perhaps did more towards emancipating the world from ancient prejudices than any other man. He ascertained that many of the opinions "which writers assert and the vulgar believe, were wholly false." Experiment enabled him to discover that effects which had hitherto been attributed to magic, were brought about by purely natural causes, or could be produced without recourse to the occult science.



He boldly entered the workshop of a lapidary and convinced himself that a diamond could be cut without the aid of goat's blood. Concealing one of the potent ingredients in a mysterious anagram, he declared the nature of that composition whose flame and sound would equal the brilliancy of the lightning and the roll of the thunder. He would have smiled at the glassy globe of King Riance, and instead of seeking a vision, he would have shown how the transient sunbeam was deflected in the crystal, and was wrought into shape by the heated imagination of the seer. His ardour seems to have been so restrained by sober judgment that we should scarcely expect to find him contaminated with the prevailing dogmas. His avowed determination to consider the properties of substances only as they became revealed by experimental research, ought to have tightened the rein when there was the least divergence from that line of philosophy; but, like the "greatest, wisest, meanest of mankind," his character presents the most singular contradictions. With all his experience and keen comprehension of questions which had been puzzling mankind for centuries, he could not quite free himself from the superstition of the age. Whilst he derided the fictions of magic and repudiated dogmas which had flourished for ages, he maintained the possibility of forming a spherical astrolate, which, displaying all the arches of the heavens, should turn round on its axis in self-impelled and perpetual motion.

W. E. Bowers.

WROUGHT FLINT IMPLEMENTS FOUND AT WEST WICKHAM, KENT.

Plate VI.

This month's sketch is intended to represent an implement, or perhaps a weapon, made of flint and found during last summer in a field at West Wickham by the writer. It is needless to give a detailed description of the shape of this flint, as the representation will give a fairly good idea of its general form. The exact manner in which it was used in ancient times, and the purpose to which it was put, may not however be so evident. I am inclined to think that it is a very early (and consequently rude) specimen of a celt or hatchet. It will be observed that the cutting edge is made of a semicircular shape—a form which would probably first suggest itself to a man unused to the best methods of shaping his tools. The upper and smaller end may have been inserted in a hollow bone or between a forked or split stick, in which position it would be a much more formidable weapon than if it were merely held in the hand.

Geo. Clinch.

NESTS OF FISHES.

Among nearly all the Mammalia and higher classes of animals, the duties of parents to their young are most assiduously performed, food being provided, and the offspring generally nursed and cared for till they "come of age," and can fight their own battles. But we do not find this principle among the inferior animals. It is true that in the *Insecta* great pains are taken in constructing nests for the eggs, and food is provided for the future young; here, however, all solicitude ends.

At a superficial glance, aquatic animals evince great carelessness in this respect. Fish deposit their spawn almost at random—in the sand at the sea-shore, on small pebbles of the river, leaves of plants, and sea-weed, their only protection being the gluey mucilage in which they are enveloped—leaving the ova to hatch by the elements, and the young to provide for themselves.

When the young "fry"—and, alas! ere long some are destined to be fried—are developed, they associate in shoals and swim about in the shallows unprotected, and are sometimes even preyed upon by their progenitors. This at first sight seems to be an outrage on the great law of paternal endearment, but a little reflection will show us that it is a wise dispensation of the great Creator. Water being continually agitated by currents, and incessantly changing its place, it would have been impossible for a parent-fish to have kept its young about it, and supposing that it could what protection would be afforded them?

Yet fishes, obedient to the great law of nature, are very solicitous in their selection of the proper locality to deposit their spawn. The herring, in countless shoals, annually makes a long journey from the North to our bays and firths. The salmon (*salmonidæ*) leaves its haunts and toils up the river-current, overleaping falls and rapids, and finally gaining the quiet shallow waters, where, amid the sand, its spawn is deposited, and where, in the sunny rill, the young may sport in safety till they come to maturity. The stickleback, contrary to the general rule, constructs a nest made of blades of grass and straw fixed upon the pebbles of its native waters. The mode of construction is very curious. Having selected the freehold plot, he collects a quantity of grass; with this he forms a sort of carpet, and in order to prevent it being carried away by the oscillation of the water, he fetches some sand, using his mouth as a shovel, with which he fixes the foundation of his nest. To make the substances firmly adhere, he slowly glides over the surface, and the mucous exuding from the skin glues them together.

As though still harassed with doubts as to the perfect unity of this portion of his nest, he agitates his pectoral fins with great rapidity, producing strong currents directed against the structure. If dissatisfied with the result of this operation, he again presses the substances together, and re-glues them, till they are perfectly strong. He now procures small pieces of wood and straw which, by means of his mouth, he arranges on the surface of the foundation. When he has successfully formed the floor and walls of his abode, he directs his attention to the roof,

which he constructs of similar material to that of the walls, glueing them together by the vibratory pressure of the body. Meanwhile he secures an entrance to the nest by repeatedly thrusting in his head and a part of his body. The nest complete, Mr. Stickleback — distinguishable by his bright red colour — darts out and invites Mrs. S. to "walk into his parlour," and deposit her eggs in the place he has prepared for them. She, nothing loath, accepts the invitation, deposits her ova, and unceremoniously effects another opening in the nest and darts out. Polygamy is evidently the rule in this tribe, for several ladies in succession enter and disappear in a similar manner. The house speedily becomes a rich magazine of ova. Pater Stickleback becomes sole guardian of the nest, for not only do the ladies take no part in its protection, but often form parts of numerous coalitions for devouring the ova. But he retains his position with undaunted courage, and bestows great care upon the ova during the stage of their development. He strengthens his nest by covering it with stones, a process involving great labour. Through several openings, which he is careful to preserve, he drives currents of water by the rapid motion of his fins. This operation seems necessary for the preservation of the eggs from matter which might otherwise destroy them. He drives away battalion after battalion of his unnatural foes, striking them with his snout and rushing among them with his long sharp spines erect. He seems to be well up in strategy, even without graduating at Sandhurst, for when almost overpowered by the "sheer force of superior numbers" he darts out of his nest as if in pursuit of some prey, thus deceiving the attacking force, who rush after him in the hopes of sharing in the spoils, and are thereby diverted from the nest. As the hatching period approaches a climax, he removes the stones to give more easy access to the water, enlarges the opening, increases the frequency of the currents, and moves the eggs nearer the surface, or carries them deeper if needful. When the eggs are hatched his watchful care is still the same, and the young are not allowed to roam at liberty till sufficiently strong to hold their own in the struggle for life.

SOCIETIES' MEETINGS.

West London Scientific Association.—Mar. 15.—Lecture on "Movements of Plants," by the Rev. Prof. Henslow, M.A. The lecturer gave an interesting description of the movements which were to be noticed in the germinating seed. Of the two primary movements, the persistent descent of the *radicle* into the earth (no matter in what position the seed be placed), is only to be accounted for, in the present state of knowledge, by the influence of gravity. The only part of the radicle, however, which is actually affected by the force of gravity, is the extreme tip. If the tip be removed, or cauterized, the influence no longer exists, but is renewed upon a new tip being formed. This attraction of the radicle towards the earth has been called *geotropism*, in contradistinction

to apogeotropism (in obedience to which stems grow erect) and heliotropism,—for the radicle is in no way affected by light, but will seek the earth in the dark in just the same way. The geotropic influence can be destroyed by placing germinating seeds upon a vertically rotating wheel. In this case the roots will be directed outwards by centrifugal force. If the wheel be horizontal, then, by varying the rotation of the wheel, corresponding variations are produced in the oblique direction in which the roots will grow. This descent of the radicle forms one of the primary movements observed in the germinating seed. Other complex movements follow, which are occasioned by the extreme sensitiveness of the tip of the growing radicle to *moisture*. Thus, wherever there is moisture, thither will the radicle turn, and in order to give it a better hold to enable it to exert its growing force, a development of root-hairs takes place from the sides of the radicle, the points of which *melt*, as it were, into a sticky substance by means of which they are glued to the surrounding particles of earth.

These secondary movements of the radicle were seen to describe irregular curves and zig-zag outlines when traced upon paper. Whilst the downward movement of the radicle has been ascribed to geotropism, the cause of the ascent of the plumule (apogeotropism), remains unexplained. The movements of the growing stem, in circumnutating from side to side, and in sweeping, though irregular, circles, were next described, and shown to be due to the alternate enlargement, or *turgescence*, of the cells on either side the stem, and generally followed by *growth*, causing the plant to *bow* in every direction successively. The chief uses to which circumnutation is applied in plants, are those of climbing. Climbing-plants illustrate circumnutation in a stronger degree than most others, but some curious examples of the movement were exhibited, in which the design was of a special character. Movement in plants is exemplified in a number of ways, and is more or less abrupt in some cases, whilst in others extremely slow ; the reflex action of the " tentacles " of the Sundew (*Drosera*) was described, together with the nyctitropic movements, or the folding up of leaves of various plants under the condition known as " sleep;" the use being to protect them from radiation.

The lecturer passed on to consider certain movements occurring in the parts of flowers, such being of service in the process of insect-fertilization Thus the keel and wing-petals of *Indigofera* and *Genista* are in a high state of tension, so that on an insect entering the flower, they suddenly curl back and cause a sort of explosion, whereby the insect gets dusted with pollen. In *Medicago*, a somewhat similar explosion takes place, but it is the staminal tube which curls upwards. In the Barberry, the stamens are irritable, so that on being touched they spring forward, &c.

These different movements first described above can mainly be referred to modification of circumnutation, but the latter, such as the tentacles of *Drosera*, and stamens of Barberry, cannot be such, as the former, at least, shows no signs of circumnutating. Hence many motions must be referred to some stimulus applied to protoplasm ; for in the

Barberry, for example, "aggregation" is observed, very similar to that in the Sundew, when provided with nitrogenous food.

Highbury Microscopical and Scientific Society.—April 28.—Meeting at Mr. Glover's, 24, Aberdeen Park.—Paper on "Corals," by Mr. B. H. Woodward.

We are requested to announce that Prof. G. S. Boulger, F.L.S., F.G.S. is proposing to establish a West London Microscopical Society.

NOTES AND QUERIES.

Albinism consists in the absence of colouring matter in the subjects. It occurs in many animals, even man is not exempt from it; white niggers are among the curiosities of Africa, they are weak, generally the males rather than the women, and have pink eyes and whitish hair. Last Christmas a white sparrow used to come to the gentleman's house where I was staying, and be shot at every morning with a "catty"; unfortunately the catapult did not carry straight, and the bird escaped. A white woodcock has been seen; rabbits, moles, mice, &c., are known to be subject to albinism. Rats with pink eyes and white hair are much petted by boys. They were once, probably, albinoes of the black rat, but have now become a distinct race, and will breed with the black rats which are nearly extinct. I think I have heard that rats and mice become white by living in the dark; whether their seeing best at night is an argument in favour of this I do not know. Among lepidoptera, loss of colour has been observed in some species; *Militæa euphrosyne* has been taken almost white, and pale specimens of *Arctia caja* occur comparatively often.

Josephus.

Perversity of Locusts.—With regard to the perversity of insects in "never knowing when they are dead," I will give you my father's experience with a large brown locust, which was certainly as difficult to kill as the one "S. M." dissected in Italy. This locust was taken in Norfolk, and was presented alive to my father; he, not understanding the habits of the insect, attempted to kill it by means of chloroform. When treated in the ordinary way, however, no effect whatever was produced: it was then immersed in chloroform, and so remained for a day; it appeared to be quite dead, but was only torpid, and on the entire evaporation of the liquid became as lively as before immersion. Attempts were made to destroy it with rectified alcohol and sulphuric ether successively, but no effect could be detected. Finally it was immersed in boiling chloroform until life became extinct. This process occupied altogether four days.

Charles Edward Ince.

LUNAR PHENOMENON.—Many of your readers no doubt noticed the curious ring round the moon on the night of Friday the 11th inst. A friend of mine tells me that in India this phenomenon, which is undoubtedly of atmospheric origin, is of frequent occurrence, and is looked upon as the forerunner of a storm or other violent change in the weather. In England it is of rarer occurrence. My brother, on a voyage, saw an instance of it when crossing the Equator, and the sailors then said it foretold a storm. L. C. P.

NORTH CONE.—*In Answer to Charles E. Ince.*—The North Cone signifies that a gale is to be expected from the north, and consists of a canvas cone suspended from the flagstaffs at Coastguard stations, wherever the storm is to be expected. The South Cone is the same thing reversed. The East and West Cones, or rather Storm Drums, consist of cylinders with cones hung above or below them, as the case may be. The Cone is of immense use to ships, which are thus warned of coming storms. Probably a cone and cylinder is preferred to a flag, because it appears of exactly the same shape from all points of the compass. At night lamps are used, slung in different positions. JOSEPHUS.

QUERY AS TO WASP.—I have a small wasp in my collection, which I obtained two years ago in Scotland. While examining a wild rose plant in search of caterpillars, I saw a strange excrescence on one of the leaves, and on looking closely I found a wasp quite dead and in perfect condition, but with the leaf pierced with the tongue. It appeared as though the insect had been unable to withdraw the tongue, and had thus been detained an unwilling prisoner until it died of starvation. Can any correspondent to NATURAL HISTORY NOTES explain how the wasp could have put himself in this predicament? CHARLES EDWARD INCE.

ENTOMOLOGICAL NOTES.—The first butterflies I have seen this year were a peacock (*Vanesso io*) and a male brimstone (*Rhodocera rhamni*) on March 10. I caught a good specimen of the March moth (*Auisopteryx æscularia*) on 12th inst; is not this an early specimen, as the moth is usually captured in April? S. S., Cobham.

EXCHANGE COLUMN.

The fee for insertions in this column, is at the rate of 1d. per line.

Communications for the Editor should be addressed FRANK J. ROWBOTHAM, 42, Loftus Road, Shepherd's Bush, London, W., and should reach him not later than the 15th of each month.

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Natural History Notes.

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FRANK J. ROWBOTHAM.

MAY, 1881.

ENTOMOLOGY FOR MAY.

In the month of May, there appear not only the newly-hatched spring butterflies, but also many hybernated specimens, chiefly of the genera *Pieris* and *Vanessa*. Worn specimens of the Clouded Yellow *(Colias Edusa)* and the Brimstone *(Gonipteryx Rhamni)* sport together over flowery banks. The Small Tortoiseshell *(V. Urticæ)* which occurs throughout the summer, is sometimes induced by a sunshiny day, in almost the depth of winter, to leave its retreat for a while. The Red Admiral and Peacock butterflies survive less frequently. Then, again, among the butterflies "just out," is the beautiful Bath-White *(P. Daplidæ)*, which is so easily mistaken for one of its more common congeners; during the last few years it has been seen more often, owing partly, perhaps, to its having been more looked after, and partly to an increase in numbers. This is often mistaken for one of the common Cabbage Whites. Another butterfly which can be mistaken for the Large White *(P. Brassicæ)* is the rare pale variety *(Helice)* of the female Clouded Yellow. The chief feature that distinguishes it from *C. Hyale*, the pale Clouded Yellow, is the black marginal band of the fore wings which is of the same width throughout, instead of, as in *Hyale*, gradually tapering. The Orange Tip *(E. Cardamines)* also flies during this month, and, flying but slowly, can easily be taken. The underside of the hind wings of this butterfly, appears, to the naked eye, to be mottled with dark green, yellow and white, but under the microscope the green effect disappears, and is seen to be due to the black and yellow scales which together produce the green colour; the same effect is seen in *Daplidiæ*, but in a lesser degree. The larvæ of the Six-spot Burnet Moth (*Zygaena Filipendulæ*) may now be found feeding chiefly on low leguminous plants, from which they may be obtained by

sweeping. The moth itself generally appears in June. Early specimens of the Privet Hawk Moth (*Sphinx Ligustri*), the very rare Pine Hawk (*Pinastri*) and *Convolvuli* are met with in this month. The Convolvulus Hawk Moth is found hovering over flowers in gardens, at dusk; *Pinastri* over honeysuckle, &c.

Among Hymenoptera, the wasp (*Vespa Vulgaris*), which begins to build its nest in May, is perhaps the most interesting. Early in the month, the female wasp may be seen looking out for lodgings; when she has found a suitable spot, which may consist of the deserted hole of a mole or rabbit, or perhaps some crevice in an old wall or tree, she hastily makes a few cells, in each of which she places an egg. Her maternal cares now begin, and last until the end of the season. Every now and then she puts her head into the cells to see how the egg is; when they are hatched she is busily engaged in feeding the grubs; the young ones have honey and sugar and the older ones pieces of meat. After they have passed a few days in the chrysalis state, they hatch into workers or females and aid in feeding more larvæ, or making new cells. Thus the nest goes on increasing all the summer, but when the first frost is felt, the wasps furiously assault the young grubs and chrysalises, and, having killed them, throw them out of the nest,—the reason for this proceeding being that as the cold weather is approaching, the grubs would die of starvation and cold. Thus, what at first sight appears to be the most savage cruelty, is in reality an instance of the power of an all-seeing and ever-provident Creator. T.

A FEW WORDS ON HYDRÆ.

Those who have had experience in aquarium-keeping, are tolerably familiar with the green, or brown, gelatinous-looking little bodies of the two species of hydræ (*H. Viridis* and *H. Fusca*) which, attached by their bases to the glass, spread their delicate tentacles either upwards or downwards in search of food; and woe betide the luckless *Daphnia* who comes into collision with those outstretched arms, for he is immediately tucked into the hydra's stomach and digested.

The length (at times exceeding four inches) to which these tentacles can be elongated, is enormous when compared with the size of the

hydra itself (from $\frac{1}{4}$ to $\frac{1}{2}$ inch). The extremity of one of the tentacles, when fully outstretched, appears no thicker than a spider's web, and yet it is able to detain in its grasp a lively *Daphnia*.

The mouth of the hydra is situated in the midst of the circle formed by the tentacles: the cavity of the stomach, into which it directly opens, occupying the whole interior of the body. The digestive process consists in the absorption of the nutritive portions of the prey into the substance of the hydra, and the rejection of the unnutritious residuum through the mouth. The manner in which the digestion is effected is not well understood, unless it is by the supposed presence of a fluid analagous to the gastric juice, inasmuch as all traces of an intestinal apparatus are absent.

Reproduction takes place by two processes,—*asexually*, by budding and the ultimate detachment of the young hydræ so formed from the parent, and *sexually*. Reproduction by gemmation takes place during the greater part of the year. In summer, numerous projections of the surface appear a little way below the bases of the tentacles. These are the *testes*, within which are developed great numbers of minute particles termed *Spermatozoa*, (each of which is possessed of a vibratile cilium), which are ultimately set free. These constitute the *male* element of hydra. At the same time a projection appears at the base of the hydra, which becomes much larger than the testes, and is called the *ovary*. Within this is developed a single egg, or *ovum*. This ovum, on being impregnated by the ripe spermatozoa, undergoes division into two parts, each of which divides again into two, and this continues until the ovum is split up into a number of small embryo-cells. The mass of cells thus formed, called the *ovi-sac*, is then detached from the body, and, falling to the bottom, forms the "egg," from which a new hydra is developed in the following spring.

INSECT VITALITY.

The curious vitality, down to the "last leg," of the *gryllus*, as described by "S. M.," raises, of course, the whole question of "What is Life?" but into this question it is impossible, of course, to enter in these pages. Of the automatic nature of the various parts of an insect, there can, I

think, be no doubt, and the whole behaviour of these parts, as detailed by "S. M.," seems to show that there can be no concentrated sensation such as *we* experience, or why should some insects—aye, and animals of a higher order—part with limbs on the smallest provocation.

Everybody who has caught the Crane-Fly, or Daddy Long-Legs, in their hands, knows the tendency they have to leave a leg or two behind them. So, too, will the Harvest-Man Spider (*Phalangium*). Lobsters and crabs, it is well known, will readily on alarm part with a big claw. Furthermore, both the lizard, and his cousin the slowworm, have a provoking habit, when you attempt to catch them, of leaving the tail wriggling in your hand, whilst the creature itself escapes. There can, therefore, be no great *feeling*, as we know it, on the part of the creature, or it would not be so prodigal of its members, even though the dis-associated portion exhibits such frantic signs of vitality; the object of such movement apparently being to distract your attention, and afford you some amusement, whilst the owner decamps.

In the case of the spider, to which I especially wish to allude, the motion appears to be *rhythmical* rather than spasmodic, and seems to suggest a conviction on the part of the limb that it is still attached to the spider, and assisting its quondam owner to walk, nor can it for some hours be convinced to the contrary. The last order it had received from the ganglion was "go ahead." A similar punctuality in executing the last order received, occurs to me in the case of a decapitated mouse, whose head had been completely and instantaneously severed by the blow of a falling trap. The legs, acting on the last message transmitted to them, had conveyed the body back at least a yard from the trap.

These little points I venture to bring forward, not as any attempted explanation of the "poser" propounded by "S. M.," but merely because they should be taken into consideration by those who seek to work out the problem for themselves.

B. B. W.

THE PLEASURE AND PROFIT OF COUNTRY RAMBLES.

Mrs. Barbauld once related a pleasing story of a youth, who, rejoicing in the full play of healthful life and spirits, returned home from a day's skating on a frozen pond to tell his father that he wished it were always

winter. The wise father made no comment on the boyish wish, but simply asked his son to write it down; and soon the circumstance was forgotten. The spring season came in, with its milder breezes; the young leaves appeared on the trees and plants; the birds prepared their nests, and the woods thrilled with the melody of their loves Delighted with the change, young Henry could not help exclaiming to his father, as they walked forth together to enjoy the awakening beauties of nature, that he wished it were always spring. His second wish was noted down, and forgotten. Summer came, with its delightful warmth and its floral beauties; autumn succeeded, with its joyous harvest-fields; each in turn seeming to the happy boy more delightful than all that had preceded it. At length, when he had uttered the wish that harvesting should never cease, his father produced the record of his own successive wishes, and proved to him how little capable we are of ordering that which is best for ourselves, or of wisely comparing the present with the past.

To a superficial observer, the utility of the seasons appears only as they minister to his present enjoyments. Like the sanguine youth, he would have the fresh breezes of spring, or the warm glow and full blown maturity of summer, last for ever, forgetting that winter too has its share in the economy of nature. During the apparently inactive winter months, vital functions of the most essential character are at work. The soil, saturated with moisture, is heaped up and pulverised by the alternate expansion and contraction of frost and thaw, and is thus prepared to supply fresh nutriment to the vegetable kingdom in the spring. But for this annual operation of the frosts of winter in high latitudes, some of our best soils would remain nearly unproductive.

A country ramble on a clear, bracing morning in early spring is one of the most enjoyable treats that can be experienced by "one long in city pent." Though the trees and hedgerows are bare, the buds show signs of life. The black-bird and thrush are in song; and the lark, high overhead, trills forth its thrilling music. Once and again the rambler may catch a glimpse of a ploughman with his team; and hear the far off ringing of the horses' gear as they turn at the end of the furrow.

A knowledge of the field-sciences will enable one to pursue his country rambles with far greater pleasure and profit than can accrue to the mere superficial observer. In nature, there are no objects, however

common and familiar, that cannot reveal an interesting story if we are but intelligent enough to question them in the right manner. Fresh pleasures await those who are willing to dive deeper into the mysteries of nature. The wayside flowers will become invested with new charms as the mind expands with a knowledge of their structure and growth, their habits and uses. Flowers have at all times been special favourites with the lovers of nature. The important functions which they perform cannot be too widely appreciated. Plants consume the carbon from the poisonous carbonic acid with which animal respiration and the combustion of fuel have polluted the air, and release the oxygen which is necessary to animal life ; were all vegetable life withdrawn from the globe, animal life would quickly cease, so intimate is the connection between plants and animals. Hence the public parks and gardens, and the trees along our busy thoroughfares, perform good service as breathing spaces for the inhabitants of our crowded city.

The pond which we stumble upon in the course of our ramble teems with animal and vegetable life The surface in parts is covered with a green mantle which in itself presents an object for lengthened study. Myriads of tiny creatures make this *algæ* their home. If we penetrate this mass of vegetation, we find a variety of pondweeds, such as the American Pondweed, (*Anacharis alsinastrum*); the Water Starwort, (*Callitriche verna*) ; the Water Crow-foot, (*Ranunculus aquatilis*) ; the Frogbit, (*Hydrocharis morsus ranæ*) ; and others. The small finny tribe is also abundant. A little dredging with a net will produce species of insects in various stages. One of the most remarkable species is the larvæ of Dragon flies. These larvæ have long bodies, each with six long legs, and a pair of apparently aborted wings on its back. In this stage they inhabit the water for several years, and then the wings develop, the old skin bursts, and they leave the watery element for ever. In the perfect state they fly over the ponds in which they had previously existed. In both stages they are equally ravenous. Caddis-worms, water beetles, gnats, water-bugs, and water-fleas, are all full of interest to the etomological rambler, and present an inexhaustible subject for study.

A country ramble is pleasant and profitable for the sake of the calm repose which the rambler shares in common with nature. We picture to ourselves, as we conclude these lines, a deep lane in Devonshire,

where high banks, surmounted with giant smooth-stemmed beeches, shut out the scorching rays of the summer's sun; while on either side, adorned with a luxuriant profusion of ferns, the most beautiful and graceful of nature's productions, the green glades refresh our vision.

SOCIETIES' MEETINGS.

HIGHBURY MICROSCOPICAL AND SCIENTIFIC SOCIETY. May 7.—Excursion to Finchley, directed by the President. May 12.—Meeting at Mr. Moritz', 3, Highbury Quadrant; Conversational. May 26.—Meeting at Mr. Worsley-Benison's, 25, Grange Road; Paper by Mr. H. W. S. Worsley-Benison, F.L.S., "How Plants Grow."

NOTES AND QUERIES.

CRUELTY TO SNAILS.—In a previous number (p. 10) "S. M." has protested against the brutal method which people too commonly employ when endeavouring to get rid of certain obnoxious and unbidden guests. "S. M." justly remarks that were the unfortunate victim suddenly to be rendered of such a size that its condition would infallibly attract the attention of every passer-by, the whole world would cry out against the perpetrator of the deed; and yet there is another creature, many times larger than the flea, and like it, possessed of highly-developed nervous system, which is, alas, only too frequently subjected to a treatment every wit as barbarous as that complained of by "S. M." The poor garden-snail, crushed under the heel of the enraged horticulturist, is as long dying, and suffers as much agony in the process, as the unfortunate flea.

We therefore appeal to the readers of NATURAL HISTORY NOTES, and all lovers of animate beings, to aid in the suppression of this piece of wanton cruelty.

The method we would advocate for the destruction of the offending molluscs, is that they should be kept in an old garden-pot, or other receptacle, till a sufficient number be collected, when by placing the victims in a pipkin with a handful of common table-salt, and pouring *boiling* water over them, life may be instantly and, comparatively speaking, painlessly destroyed. B. B. W.

THE SHINING SLAVE-MAKER (*Polyergus lucidus*).—A paper on the discovery, at the foot of the Allegheny Mountains, near Altoona, of a nest *Polyergus lucidus*, the American representative of the Legionary Ant of Huber (*P. rufescens*), was read by the Rev. H. M'Cook

before the Academy of Natural Sciences of Philadelphia. The nest had four gates separated by a few inches from each other; the chambers were placed one above the other, united by tubular galleries. In an inner ovoid chamber numbers of the ants, male and female, appeared; mingled with these in large numbers were workers in three forms—major, minor and dwarf, of *Formica Schauffussi*. A portion of the excavated nest was broken into, and on the next day but one was visited. None of the shining ants were at work, but the "slaves" were busy cleaning out the galleries; a portion of the slaves were engaged in an extensive migration; a few were carrying their fellows, but for the most part the work of deportation was confined to the males and females of the shining ants. It was wonderful to see the large virgin-queens carried up the perpendicular face of the cutting for eighteen or twenty inches, and then for the distance of six feet over the ground and through the grass, and this in a few seconds over a minute. The shining ants are able to take a most wonderful grip. One of them had fallen under the displeasure of another, who held her firmly by the middle thorax. Anxious to preserve the colony from unnecessary loss, Mr. M'Cook lifted the two out on the point of a quill toothpick, laid them on his hand, and thrust the fine point of the quill between the jaws of the aggressor, and so teased her that she released her fellow. The rescued ant instantly clasped the palm of his hand, threw her abdomen under her, and then, with back curved like that of an angry cat, sawed and tugged away at the skin until an abrasion was made. The other ant still clung fast by her mandibles only to the toothpick's point, her body stretched out into space, her limbs stretched outwards, except one hind leg, which was a little bent upward, and thus without any perceptible support, except that which her jaws gave her upon the quill-point, she hung outstretched for several minutes. . . Various experiments seemed to establish the fact that these slave-makers always keep a guard at once for any attack.

EXCHANGES.

(*The fee for insertion in this column is at the rate of* 1*d. per line*).

To Entomologists.—I have many duplicates of some of the British butterflies (though not particularly rare) which I am willing to give in exchange for specimens I have not. List sent if required. G. S. Bowler, 21, Pembroke Square, Kensington, W.

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JUNE, 1881.

TRAVELLING PLANTS.

A CORRESPONDENT writes to me: "Do lilies locomote? You may invent a better word. They certainly do shift their places in the ground; but how?" He then gives me a description, by small circles and dots, of the position in which his groups of three, or lines of single lilies, were planted, at regular intervals from each other, and shows in what different positions they had appeared. In a second letter, at my request, he gives me a diagram of the direction in which they had journeyed. Out of fifteen, planted singly in five rows, nine have come up to the east of the spot where they were originally set. One row seems never to have appeared at all, and my correspondent notes this: "Line 3 is perplexing; query,—have the originals drifted, and turned adrift several young ones? or has line 4 moved up towards line 3? No sign of life on line 4, but the *slugs* may have something to say about this!" And they *have*, doubtless, as we shall mention by-and-by; but not to accuse the "sophtsluggia glutinosa" of having entirely devoured them; but of having probably aided their underground voyages. After giving me this "map of the emigrating lilies," Mr. W. continues:—"Lilies grown in pots, often fidget about as much as they can, and come up at the side instead of in the centre of the pot. I suppose the gardener's theory, that the slugs poke the lilies aside with their noses, must be abandoned." We shall see later on that the theory, although untenable as thus stated by the gardener, is instructive and suggestive, and not without a foundation of truth. For, although I look upon gardeners, as a rule, as being the class of men most blackly ignorant of their own business,—having their attention principally, and excitedly, fixed upon the problem, "Given, a pocket-knife, how much to cut away and destroy in a given garden,"—yet I always like to hear any remarks,

however ignorant, as they are sometimes useful; as Buddha* remarked after a song from some nautch girls: "Even a fool may teach the wise." Mr. W. remarks, what other observers confirm, "that the common white lily (*Lilium candidum*) 'The plant and flower of light,' (Ben Johnson), does not travel observably; and when the bulbs multiply, they usually keep together in orderly clumps. *L. auratum* and *L. lancifolium* (or *speciosum*, as it is now called) are the most nomadic in my garden."

Now, thanks to the patient researches of a host of careful observers, especially since the year A.D. 1700, the question of the movement of every part of a plant, and the underground migration of some, is at last placed in full light before us; and a careful study of the works of some of these guides, will enable us to observe wisely, and to the purpose. Every fact collected by the humblest, yet most faithful student of nature, will help to complete what they, necessarily, have left incomplete. A few of these names may be inserted here, as useful to students, dwellers in great cities, where there are great public libraries, and generous librarians to help one to find the required volumes.

As far back as the first century, we find Pliny notices the *sleep* of plants; but is is from 1700 to 1880 that there has been, each year, some patient observation made, and a record of such published, by the following authors, whose names I have mostly placed in rough chronological order, giving a few dates here and there, and allowing myself to draw attention to some of the most interesting and important, for the purpose of the study. Mairon, 1720; Dufay, Lamark, Lindsay, Comparetti, Linnæus, 1765; Bruce, De Candolle, Bert, Morren, Bassen, Oken, Frank, Royer, Duchatre, Brongniart, Duval Jouve, Flahault, Cl. Bernard, Hofmeister, De Vries, Vine, Sachs, Edourd Heckel—whose valuable work, "Du Mouvement Vegetal," is an admirable contribution to science,—Elfing, Hooker, and, finally, the three Darwins, who for nearly a century past, until this time, have been "Kings in the realms of Mind."

The whole study of the life and movements of plants is so interesting, and involves so many problems concerning the unity of the two kingdoms, animal and vegetable — nay, including also the mineral, or seemingly most lifeless and motionless kingdom—that a few words

* "The Light of Asia." E. Arnold.

about the study, and the way by which it has attained its present important position, may be acceptable to the readers of NATURAL HISTORY NOTES.

The conspicuous movement of the leaves of the sensitive plant, and the anthers of the *Berberis vulgaris*, *Mahonia aquifolia*, and others, were, of course, early observed, and led to the patient researches of the authors I have just named. There was soon noticed a difference between *spontaneous*, and *provoked* movement. Most interesting experiments were tried with chemical agents, anæsthetics, such as chloroform, &c.; every part of a plant was questioned, from the root to the corolla; every division of the vegetable kingdom was studied; till plants, never before suspected of any movement beyond that incidental on increase of size, and necessary movement accompanying growth, were found to be capable of most astonishing spontaneous, or induced activity, or of both.

From the most highly organized Dicotyledons, down to the lowest of the Cryptogams, movement has been found to exist. A comparison was made between the movements of the animal and vegetable kingdoms, and such startling facts were discovered, that one felt uneasy as to whether man was a cabbage, or the cabbage a man. Plants are found to be carnivorous. They not only eat and drink, but sleep and nod—and possibly *snore*, if we could only, like Fine-ear of the fairy tales, hear the grass grow. Plants can faint; can become insensitive to surgical operations, to vivisection, under chloroform; can recover from the effects of anæsthetics, or die of an over-dose of them, like "any other man." They have spotty diseases, for which, as one of our living and learned professors has shown by experiment, they can be inoculated. They suffer from frost bites, and also from sunstroke. Certain changes of colour in leaves, have led to the diseased colouring being given the same names as are given to certain human diseases. Plants can have too much and too little sap, and the kindred conditions of blood in the human or other animal, lends its name to the plant. Leaves have bilious attacks. Plants can catch cold, and are really provided with all sorts of contrivances to save their complexion, in the form of contractile hoods and veils; contrivances for presenting the least, or the most, of their surface to heat or cold, as the case may require. They turn away with annoyance from any obstacle, or injurious touch; they per-

sistently seek and push towards the light, if they *like* light, or shun it as obstinately and cunningly if they prefer darkness, and seem sometimes to be absolutely outwitting the experimenter. Who knows !—there may be chuckling and laughing among them at his expense ?

(*To be continued.*) S. M.

BUTTERFLIES FOR JUNE.

The first butterfly on our list for this month, is the Orange Tip (*Anthocharis cardamines*), which may still be caught during the first week or two. The males of the Mountain Ringlet (*Erebia Cassiope*) appear at the end of the month, and the females follow them a little later. Marshy places, in the mountain-districts of Cumberland, are localities for this butterfly. The Swallow-tail (*P. Machaon*) will still be out in the fen counties, where its long and powerful flight will make it conspicuous to the collector. The Black-veined White (*Aporia cratægi*) which next makes its appearance, is only met with in June, and is found in a very limited number of localities, as at Herne Bay, Faversham, (Kent), the New Forest, etc. This can scarcely be distinguished from the common White, when on the wing, but, when caught, the conspicuous black veins, and the absence of black markings, easily serve to distinguish it.

Pieris Brassicæ and *P. Rapæ* (the large and small garden Whites) are, of course, plentiful; the Green-veined White (*P. Napi*), though found now, is more abundant next month. *P. Napi* is more variable in size than any other of the family, some specimens being over two inches across the wings, and others no bigger than a Small Copper. The colour of the veins also changes, varying from grey to yellowish green.

The first specimen of the *Latyridi*, which appears this month, is the Speckled Wood (*Lasiommata Egeria*), which may be found, not uncommonly, in woody paths; the caterpillar, like those of the rest of its family, feeds on grasses; its colour is dark green, with white stripes on its sides.

Another closely allied butterfly is the very common Meadow Brown (*Hipparchia Janira*), which first appears this month, and remains till the end of August. The male of this species is very like the Ringlet

butterfly, except on the under side, which is marked with duller, and lighter, brown ; whilst, in the Ringlet, the under side is like the upper side, but with a row of black eye-spots ; the female of *H. Janira*, however, has a large yellow patch, and an eyespot, on the sombre brown of the forewings. The Ringlet (*H. hyperanthus*) appears at the same time as *H. Janira*, but does not last so long.

In the north of England, *Cœnonympha Davus* (the Large Heath), may be met with on marshy heaths, in the lake district, and in many other parts of England. It may be distinguished from the next species, *C. Pamphilus*, which first appears this month, by the fact that it possesses a row of black eyespots *with white centres*, on the under side of the hind wings ; and also by its larger size.

We now come to the next genus, *Vanessa*, which is but poorly represented in this month. The small Tortoiseshell butterfly is the only one seen, and is newly hatched from the chrysalis ; all the other hybernated specimens will have died.

Among the *Fritillaries*, the first brood of the very lovely *A. Lathonia* —the Queen of Spain fritillary—now appears; the second brood appears in September. This butterfly often settles on paths, and frequents woody lanes and clover fields. Though generally taken on the south coast, it has been captured as far north as Cromer, and in many other localities. The Glanville Fritillary (*Melitæa cinxia*) is found as late as the middle of June, but generally appears early in May. It may be met with on the undercliffs in the Isle of Wight, and at Folkestone, Dover, and other places. The Greasy Fritillary (*M. Artemis*) is another local south coast insect, which appears in June. It is commoner, and more widely distributed, than *M. cinxia*. The Duke of Burgundy Fritillary (*Nemeobius Lucina*), is a small butterfly, with a big and inappropriate name, for, although its markings resemble those of a fritillary, it is in no way allied to them ; its caterpillar is woodlouse-shaped, while that of the fritillary is thorny and long ; the chrysalis is suspended in the same way as that of the *Pieridi*, whilst in the fritillary it hangs by the tail ; and the first two legs in the male are not fully developed. This local species will be very common in one small corner of a field, without a single specimen being found elsewhere. It is widely distributed.

Almost all the species of the next genus, the Hairstreaks, are but

rarely taken in England. The Green Hairstreak is one of the more common. Its first brood appears now; it is widely distributed, and settles on brambles, and low trees.

The pretty Small Copper (*Chrysophanus phlæas*) is abundant now; it is probably triple brooded, appearing in April, June, and August. The larva feeds on the sorrel.

In the *Polyommati*, or Blues, we find the Bedford Blue (*Polyommatus Alsus*) now out. It is caught all over England, preferring the rough sides of overgrown chalk-pits. This is the smallest British butterfly, expanding under an inch across the wings. The Brown Argus (*P. agestis*) is now common on the Downs of the south coast.

Our list of butterflies ends with the *Hesperidæ*, or Skippers. The Chequered Skipper (*Steropes paniscus*) is the only one of them which appears in June. It is local, occurring in only a few places. The caterpillar feeds on the plantain and dog's-tail grass. E. H. H.

NOTES ON TWO CURIOUS PITS AT BLACKHEATH.

Some little time ago, two rather curious subterranean cavities were brought to light on Blackheath, in consequence of the breaking away of the slight stratum of earth which formerly covered them. The form of one was of an oval, perpendicular, shaft—very straight, and reaching to a depth of, perhaps, from 15 to 20 feet, but upon this point I cannot be quite sure, as, when I examined it, I had no means at hand of ascertaining its exact depth. There can be no doubt, however, that the shaft was originally much deeper than at present, because a considerable quantity of *debris* must have been, for many years, falling into it. The form of the other cavity is quite different. A small, circular, ring-like neck gives access to a large chamber, now much filled up with *debris*. From an examination of what is visible of the chamber, it is evident that the shape must have been that of a central chamber, with three short galleries branching out therefrom.

The popular opinion in the neighbourhood, as to the origin or cause of these pits, is that they have been produced by the action of springs of water, which, in making their way through the porous pebble-beds,

have gradually removed the pebbles and sand, and thus formed these cavities. The object of this brief paper is to point out how utterly impossible it is that such pits as these could be the result of springs.

After an examination of the general appearance of the pits themselves, and of the strata of gravel or pebble-beds in which they are formed, I feel quite convinced that they are *excavations*. There can be no question that the pebbles and sand were originally deposited in water, and they would therefore fit as closely together and occupy as small a place as possible. The smaller sand would fall into the spaces between the grains of coarser sand in such a manner as to render it quite impossible for any spring now-a-days to do as much as displace a single grain. Any one who would prove this, should closely examine the sand between the pebbles, and he will find its position as I have stated. I do not say, of course, that certain springs may not have acted upon the walls of the excavations after they were made. There can be no doubt that, after a large rainfall, the passage of the water through the porous layers of pebble-beds might displace several pebbles, and perhaps some large blocks of sand, from the sides of any such cavity or cavities as those of which I am now writing. It might, indeed, for a time, fill up the cavity with water, and thus, perhaps, give rise to the spring theory, but I cannot for one moment believe that any amount of rain from above, or springs of water from beneath, could produce a regularly shaped shaft, reaching down for a distance of at least twenty feet.

I believe, as I have said, that they are excavations, and, from their regular form, I think we may consider them to be the workmanship of man, but for what object or purpose they were made, is a question not, perhaps, so easily answered. The form of the shaft resembles that of a class of pits sometimes called "dane-holes," or "bottle-pits," which are to be met with in various parts of Kent. Camden, in his "Brittania," gives representations of two such pits at Tilbury, and makes mention of several others in Kent. In most cases, such shafts communicate with a chamber or gallery, or with a series of chambers or galleries, reaching to great distances, and sometimes probably extending to other similar shafts. There may possibly exist some such extension at the bottom of the shaft at Blackheath, but which is at present covered by the fallen *debris*. The three-chambered form of the other excavation is also curious, and

it is probably the termination of a lateral gallery, radiating from a shaft elsewhere.

I regret that I have been unable, in these short notes, to enter as fully as I could have wished into my subject. My object has been to direct the reader's attention to the study, rather than to weary him with dry and uninteresting detail. I shall hope to see, in these pages, notes on any similar pit or excavation which the reader may come across: and I am especially anxious to learn what I can about any pit, cavern, well, rock, or old tree, which may have any legend or superstitious tale connected with it.

GEO. CLINCH.

THE MICROSCOPY OF CÆSAR'S WELL, KESTON COMMON.

To the microscopist, Cæsar's Well has long been a favourite locality for several very interesting species of Desmidiaceæ and Algæ. Dippings from the well abound with a variety of beautiful forms, a few of which are given on Plate I.

A very interesting form of algæ (*Batrachospermum moniliforme*) is shewn at fig. 1, which was sketched under the microscope, from a specimen obtained from Cæsar's Well. The mode of growth of this alga, has a curious outward resemblance to that of *Chara*; it will be noticed that, of the two (connected) branches figured on Plate I., the right-hand branch has the internodes pretty widely developed, whilst the nodes of the left-hand branch are crowded together: the latter may possibly be an offshoot from the branch to the right; but the arrangement of the branchlets differs somewhat. Fig. 2 shews a branchlet highly magnified, which is seen to consist of nucleated (?) cells, strung together like beads. At every node of the right-hand branch are seen several opaque, globular bodies (a, fig. 1), which I take to be *antheridia*. This alga may be obtained by scraping, with a penknife, the sides of Cæsar's Well, where it flourishes abundantly.

Another of the algæ (*Draparnaldia*), may be got from the well in any quantity; and is often met with in the form of a green ball, expanded by air, either floating, or attached to the brickwork of the well. This curious globular form may be accounted for, it appears to me, by sup-

posing a bubble of air clinging to the sides of the well, or entangled in the masses of conferva which coat the sides, to have become gradually encircled by the growing vegetation, and so detained a prisoner. Under the microscope, the green covering is seen to form a close network of interlaced fibres (see fig. 4, Plate I.).

Of the Diatomaceæ, Cæsar's Well yields several interesting forms, chief amongst which is the common Chain Diatom (*Diatomia vulgare*). *Synedra* is also met with, attached to the stems of desmids, etc. (see figs. 5, 6, Plate I.).

Belonging to the Desmidiaceæ, may be mentioned *Hyalotheca dissiliens*, *Micrasterias denticulatum*, *M. rotata*, *Closterium lunula*, *C. moniliferum*, *C. striolatum*, etc., which have been met with by Mr. Clinch, of Hayes, in various parts of Keston Common.

STATISTICS WANTED.

1.—At what age do people cut their "wisdom" teeth, now-a-days? What proportion of the population born, ever cut all four? Does the age vary in different countries, races, classes, or families?

2.—What is the usual pattern of the creases and pores on the soles of the feet, and do these vary under such circumstances?

3.—What is the usual proportion in length of the "index" and second finger, and of the great and next toe, and how far are such proportions hereditary?

What we specially require now, in every branch of anthropology, from skeletal anthropometry, to the investigation of mental peculiarities, is the accumulation of copious, exact, quantitative, and statistical evidence of this kind. It can be collected, in part, by anybody and everybody, and thus the family circle may be made to contribute to the stores of Science. I will not here dilate on the practical application of such knowledge, whether in discriminating races or character, detecting thieves, correctly delineating the human form in art, or in other directions; but simply invite co-operation in the matter. I am collecting the "counts" of an indictment against Nature for her imperfections; can anyone give me cases in point, besides the well-known rudimentary organs, the aberrations of the eye, and the moth in a candle?—G. S. Boulger.

SOCIETIES' MEETINGS.

HIGHBURY MICROSCOPICAL AND SCIENTIFIC SOCIETY.—June 4.—Excursion to Ilford—Director, Mr. C. W. Blackman. June 9.—Conversazione at Harecourt Hall. June 23.—Meeting at Mr. Peacock's, 51, Highbury New Park ; Paper by Mr. J. B. Jeaffreson, M.R.C.S., "Microscope in Medicine," 7.30 p.m.

NOTES AND QUERIES.

BIRDS.—What becomes of the empty shells out of which the young birds have emerged? I found this morning the empty shell of a newly-hatched blackbird, at a considerable distance from the nest; and I have often found the shells of other birds a good distance from their nests, *but never a bit of shell near the nests.* My belief is, that the parental birds take care to remove all signs which might indicate the locality where they build. Is a bird's brain equal to such a conception (qy., dodge)? An intelligent observer, to whom I stated my views, says that he has never found a bit of eggshell in or near a nest of newly-hatched birds.

5 May, 1881. G. H. W.

SPARROW HAWK.—Early this month, a fine sparrow hawk (*Accipiter nisus*) paid a visit to the rookery, which is quite close to the seacoast, in some fine elm trees at Aldwick, Sussex; she turned the young rooks out of a nest, and commenced laying in it. As the nest was too close to the poultry-yard for the safety of the chickens, the hawk had to be disturbed, in the hope that she would leave the neighbourhood ; but instead, in her usually impudent and bold way, she turned another lot of youngsters out, and there laid three eggs, which were of a pale blueish-white, thickly blotched over with dark red-brown. S. S.

PROTECTIVE (?) ODOUR OF *Gyrinus natator*.—Have any of your readers ever noticed the peculiar and powerful odour emitted by this little beetle when handled? I have not seen the fact noticed anywhere, although my attention has been frequently called to it when handling specimens AQUARIUS.

THE NEW MOON.—It is not a little remarkable that our superstitious forefathers should have attached so much importance to the influence of the moon upon the condition of the weather. One is reminded of this superstition in country districts, where the people still retain many o

their curious sayings in reference to the supposed connection between the moon and the weather. It is only of one of these sayings, however, that I wish now to speak. It is said that if the new moon be seen very early after the change, rough and unfavourable weather is betokened. I have recently come across a similar belief in a very early Scottish ballad, entitled "Sir Patrick Spence,"* of which the following verse is a portion:

> "Late, late yestreen I saw the new moone
> Wi' the auld moone in hir arme;
> And I feir, I feir, my deir master,
> That we will com to harme."

The second line is very curious, as shewing the quaint, though striking view which the author of this ballad took of the earth's light upon the moon.

GEO. CLINCH.

PARASITES ON HYDRA.—A correspondent to *Science Gossip* (for May) reports that he has noticed what he presumes to be parasites, infesting an unusually large specimen of *Hydra fusca*. These tiny creatures swarmed over the tentacles and body of the hydra, and are described as being concavo-convex, shaped like a mussel-shell, and possessing numerous vacuoles. They move rapidly by means of cilia, which are of large size, and beautifully evident. It was noticed, that when the parasites glided over the extended tentacle, that delicate organ remained outstretched, but instantly contracted when an animalcule of smaller size came in contact with it. We may remark that, curiously enough, Mr. B. B. Woodward had, independently of the above contribution, discovered similar parasites upon a hydra in his possession, and had brought the fact before the members of the West London Scientific Association, at their meeting held on April 26. At fig. 7, on Plate I., a sketch is given of the supposed parasite, furnished by Mr. B. B. Woodward.

A CENTENARIAN EAGLE.—The following appeared in the *Globe* of 2nd May:—"According to the *Frankfurter Zeitung*, at Nakkoo, in the Island of Lapland, an eagle was shot on the 15th ult., which measured $6\frac{1}{2}$ feet between the tips of the wings. Round its neck it had a brass chain, to which a little tin box was fastened. The box contained a slip of paper on which was written in Danish, 'Caught and set free again in 1792, by N. and C. Anderson.—Bœtod in Falster, Denmark.'"

* Vide Percy's "Reliques," Vol. I., page 59.

A Remarkable Extinct Reptile.—Professor Owen, in describing the skeleton of an extinct reptile called Platypodosaurus, remarks that "of all examples of pelvic structure in extinct reptiles, this departs farthest from any modification known in existing types, and makes the nearest approach to the mammalia pelvis." *Science Gossip.*

Caterpillar.—A local Devonian name for a caterpillar is *Maulscrawl*, a fine expressive word, and worthy of general use. G. H. W.

A Clever Cat.—Brindlemew the cat, who is nearly a year old, has been brought up in the society of dogs, Tinker and Mopsy, to whom, from early kittenhood, she became strongly attached; she always accompanies them in their walks about the garden, and joins with them in chasing away intrusive cats. Now, when Tinker the dog wants to leave the room when the door is ajar, he puts in his paw and pulls it towards him to open it, and Brindlemew having, doubtless, observed this practice, attempted not long ago to do likewise, but had not sufficient muscular force for the purpose. After some deliberation, she thrust her paw through the opening into a wool-rug outside, drawing it gently towards her, till the door was sufficiently opened to pass through. This might have been an accident, but since then she has always followed the same course, but with more decision, thrusting her paw out further, so as to open the door with one vigorous pull at the rug.

I once had a cat that liked boiled milk, and used generally to have some at breakfast-time; one morning, the milk was too hot, and puss started back on tasting it, but after a time returned to the charge, dipping her paw into the milk, and then licking it, after which she lapped freely. Always afterwards she tried the warm milk with her paw before lapping it.

"I suppose you think *your* cats and dogs are cleverer than other people's?" Can't say, Miss, perhaps other people's may be as clever as mine, if other people would take the trouble to observe theirs.—G. H. W.

EXCHANGES.

(*The fee for insertion in this column is at the rate of* 1*d. per line*).

Communications for the Editor should be addressed Frank J. Rowbotham, 42, Loftus Road, Shepherd's Bush, London, W., and should reach him not later than the 15th of each month.

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Natural History Notes.

EDITED BY
FRANK J. ROWBOTHAM.

JULY, 1881.

ON REPUTED BRITISH BUTTERFLIES.

THE number of butterflies reckoned as British amounts to about sixty-five, but besides these there are great numbers that have been caught so rarely, or only at so distant a time, as to merit the name of extinct, or reputed British butterflies. These may be conveniently divided into two groups :—

(I.) Extinct ; and

(II.) Reported British, or those that *may* possibly be caught.

Among the extinct, is the scarce Swallow-tail, (*P. podalirius*) ; both the caterpillar and imago of this butterfly have been taken in England, but yet it is doubtful whether it has ever been really a British species. It resembles the more common Swallow-tail (*P. machaon*), but the black markings are in streaks parallel to the hind margin of the wings. The ground colour is creamy-yellow in those caught in Europe, but that of English specimens is rather darker. Another species perhaps extinct, is the Arran-brown (*Erebia ligea*), supposed to have been formerly taken in the island of Arran. The next extinct butterfly is the well-known Large Copper (*Chrysophanus* [*Lycæna*] *dispar*), once abundant in the fen districts, but the draining of its haunts and consequent destruction of the food-plant (*Rumex palustris*), together with the attacks of Lepidopterists, have exterminated it.

The Purple-edged Copper (*Chrysophanus* [*Lycæna*] *chryseis*), and the scarce Copper (*C.* [*L.*] *Virgaureæ*), are supposed to have also existed in the south of England.

But, besides these, several of the regular British butterflies have lately become so rare that it is probable they may soon become extinct ; thus, the Comma (*Grapta C. album*) has not, or

only very rarely, been taken for some years. Why this is so, no one can tell. The food-plants, hop, elm, currant, &c., of course are plentiful enough, so the scarcity of the food-plant, and raids by collectors, cannot be brought forward as reasons for this butterfly apparently dying out. *Cynthia cardui* and *Colias edusa*, are two marked instances of the unexplained variability in numbers which these butterflies present in different years. *Polyommatus*, *Acis*, and *Arion*, also, are not found in localities where, twenty years ago, they occurred plentifully. Two American fritillaries, *Argynnis aphrodite* and *A. cybele*, have once or twice been taken in England; the former is like *A. aglaia* (the Dark-green Fritillary), but has reddish-pink, instead of green, on the underside of the hind wings; the other is much larger, and has the upper side darker, and the under side lighter, than *A. aphrodite*. They were both captured nearly half a century ago.

We now come to the second group of the reputed British butterflies, of which some have hatched from pupæ brought over in plants from the Continent or elsewhere, whilst others have really bred in this country. Albin's Hampstead-eye (*Papilio oculatus Hampstediensis ex aureo fuscus*), was caught for the only time in Europe by Albin, many years ago. It was elegantly described (as above) by Petiver, and has puzzled Entomologists till within a few years, when it was found to be a native of Siam and Java. *Parnassius apollo* has been taken once or twice in Scotland, but is not very likely to become established there. It is a beautiful butterfly, with semi-transparent, whitish wings, with black spots and crimson eyes.

On the shores of the Mediterranean, and in the south of Europe, *Gonepteryx cleopatra* may be met with; some suppose this to be a variety of the ordinary Brimstone butterfly (*G. rhamni*), but it presents anatomical differences. It resembles *G. rhamni*, only the orange spot extends over almost all the fore wings. A few captures have been made in England, but,

being a more southern butterfly, it cannot be expected here, except in very warm seasons. Two captures have been reported of *C. hero*, a small brown butterfly, with dull orange eyelets, and a silvery streak on the hind wings. It is found, locally, in central Europe. The scarce Painted-lady (*Vanessa huntera*) has been captured in England comparatively often. It is an American species, but having become naturalized in Madeira and the Azores, it may eventually become established here. The black markings are less extensive than in *Cynthia cardui* (the common Painted-lady), and there are two large eye-spots on the underside of the hind wings. The caterpillar feeds on *Gnaphalium obtusifolium.*

Of the genus Melitæa, besides the native Britishers, two species have been captured here. The first, *M. maturna*, is a handsome fritillary, with a rich brown and orange ground-colour, and black markings. The second is *M. didyma*, which was recently taken in Scotland; its markings are 'bright reddish fulvous, with various black spots.' The next genus, Argynnis, contains the Purple Underwing, or Weaver's Fritillary, (*Argynnis dia*), which has often been caught in the south of England, but which is not yet regarded as a British species. It is like *A. selene* (the small Pearl-bordered Fritillary), but has a purplish hue on the underside of the fore-wings. The caterpillar is prickly, like all the individuals of this genus. Its colour is dark grey, with a white streak down the back, and it feeds on violets.

Very like *A. adippe* (the High-brown Fritillary), is *A. niobe*, which has been recently taken in Kent. The wings are not so bright above, and two of the nervures on the fore wings in the male are not thickened, as in *A. adippe*, and the female has some pale spots at the tip. The larva is brown, with a white stripe and reddish-white spines; it lives on violets in May. Closely allied to the White Admiral (*Limenitis sibylla*), is *L. populi*, erroneously reputed British. This is like the Purple Emperor in general appearance, but without the purple colour, and with a

band of reddish dots on the hind wings. It occurs all over Europe, except in the north-west. *Danaus erippus* (var. *archippus*), is a large common butterfly in North America, measuring four inches or more across the wings. Its colour is rich, tawny, brown, with black veins, and a wide black border to all the wings, covered with white and yellow spots. This insect has spread, during the last few years, over Java and other Pacific islands, and has even been taken in England several times. Should the larva be able to find a food-plant, it may become established in Europe. In America it feeds on several *Asclepias*.

Among the *Polyommati* are several Blues which have been reputed British; but all, except *Polyommatus boeticus*, show little chance of ever becoming indigenous to this country. The first of these is *P. dorylas*, which has long been supposed to occur in the south of England, but this is not yet ascertained. It is local and rare in most parts of Europe, and is seldom caught in Germany. The caterpillar feeds on *Melilotus officinalis*. Another is *P. alcon*, which has been erroneously reputed English; the male is purplish blue, the female is brown dusted with blue, and the underside of both sexes is dark ashy grey, rather like the Large Blue (*P. arion*). The next butterfly is the Long-tailed Blue, or Brighton Argus, *P. boeticus*), which is widely distributed in southern Europe, India, Java, &c. It is caught in the Channel Islands, and has been taken at Brighton, and several other places on the south coast. This might be mistaken for a Purple Hairstreak, only the underside is pale brown, streaked with white. The caterpillar feeds on different leguminous plants. The species shows great likelihood of ultimately establishing itself here. *Thecla ilicis*, one of the hairstreaks, caught in southern and central Europe, has been erroneously reputed British. Its colour is dark brown, the female with an orange spot on the fore-wings; the anal angle of the hind wings has a small orange spot. The under-side is rather paler, with white spots in a line; the fringes are black. It feeds on the evergreen oak.

This species completes our list of European butterflies that have been noticed in England. How many single specimens of European butterflies have been overlooked, or mistaken for others, it is impossible to determine. In some genera, even the British species are very confusing to an inexperienced entomologist; and thus an unlooked for European species is, perhaps, put down as a variety, or probably thrown away as a bad specimen. Many butterflies may, and do fly over, generally with the wind. A large flight of *Pieris rapæ* (the Small White) once flew across the Channel, and appeared like a cloud to those on board the steamers. On Easter Monday, two years ago, a large flight of Painted-ladies came to England, with a south wind, probably from Spain or Africa. Observers first thought they were a cloud of bees, and only discovered their real nature when they had settled. The Death's-head Hawk moth (*Acherontia atropos*) has been met with hundreds of miles away from land, as has also the Oleander-hawk (*Chærocampa nerii*); and butterflies of the genus Morpho are known to take very long flights. Locusts, among the Orthoptera, are good examples of migrating insects, but they only go where blown by the wind, with their backs turned towards there destination, just fanning their wings enough to keep themselves up. Such instances prove that, in all probability, many butterflies and moths which are rarely found in England, often fly over from the Continent. In fact, the Oleander-hawk moth is known rarely, if ever, to breed in England, and when found it will have come generally from southern Europe.

On the other hand, many insects are imported on plants or in the earth in which they grow, either as eggs or pupæ. The Clifden Nonpareil (*Catocalo fraxini*) came over in this manner, which explains its being so often found in greenhouses. The two American fritillaries, *Argynnis aphrodite* and *A. cybele*, were probably thus imported. *Lycæna virgaureæa*, and *chryseis*, before mentioned, certainly came in plants from Germany, as also did "Albin's Hampstead-eye," and other butterflies of which only single captures have been made in England. E. H. H.

TRAVELLING PLANTS.

(CONTINUED FROM PAGE 44)

PLANTS are perpetually revolving, (circumnutating, we are to call it now), climbing, clasping, and clinging! Why can they not *travel?* This also they can do; not merely partially, as by root (or branch) extension, but bodily underground. This movement in the case of certain seeds has long been noticed, and some country sayings—all peasant and country saws are valuable on every subject—point to this movement being well-known. Parsley-seed is a good instance of this. Like many other seeds, shortly after being sown, it is not to be found except at some distance beneath its original position, and hence the saying that: "Parsley-seed goes nine times to the devil before it comes above ground."

There is some benefit to be derived from this; or the seed would not possess this power of movement. It probably requires a darker medium for germination than the earth nearer the surface would allow. The depth in the earth to which light can penetrate, and the phenomena connected with the effect of certain rays of light reaching to certain depths, and thus influencing the germination of seeds and the growth of plants, is at present but imperfectly known. As in the deep sea no light was supposed to penetrate, and yet creatures possessing organs of vision were found; so this may be the case to a greater degree than we imagine as regards the light penetrating the earth to great depths. As a rule, the germinating seed seems to shun the upper light; and the root pushes down so vigorously into the earth, that if the soil be too heavily pressed on the seed so as to prevent the root having leverage sufficient to enable it to "arch its back" and push upwards and downwards,—the cotyledons, still in the seed-case, are forced above ground and suffer thereby, and the radicle sustains injury as well.

That seeds, portions of plants, and entire plants thus, not only grow, but move, *circumnutate*, and, as in the case of the lilies and

other plants referred to above, bodily travel, must be granted. "It moves for all they say," as a free translation might render the muttered words of Galileo. Or, to quote from a letter just received; "One thing is quite certain, that some of the lilies do move and shift about in the ground. Some plants move more rapidly and more constantly than others. The "most nomadic" lily, in Mr. W.'s garden, has been already named. The *Ophrys spiranthes*, or Lady's tresses, travels considerably. I have found it repeatedly wild, and, having carefully marked the spot, have sought in vain for it at, or near, the same place, the following year; but have found it at some five or six feet distance from the original spot. It has travelled less than this, but still to a considerable distance, when planted and observed in my wild-flower garden in Kent.

The reason for these movements is as yet but imperfectly known, while the portions of the plant principally concerned in the movements are now almost clearly known, thanks to the indefatigable researches of the writers before mentioned. The light thrown on the question by E. Heckel, *Du Mouvement Vegetal;* by Claude Bernard, *Sur l'Unité dans les deux Regnes;* and by Charles and F. Darwin, *The Movements and Habits of Climbing Plants*, and *The Power of Movement in Plants*, enables us to perceive that the movements are regulated according to the requirements of the plant, and can be modified according to circumstances. The vital, or what have been called the spontaneous, movements being persistent and constant, and not easily, and seldom completely, arrested without danger to the plant; while other movements, as the folding of the leaves in the sensitive, and other, plants; and the movements of the filaments of stamens of the *Berberis vulgaris, Sesame, Bignonia, Scrophularia*, and others, affecting the female organs in some cases, and the male organs in others; or the "provoked movement," depending upon a variable and exciting cause;—this "functional irritability" can be easily arrested by anæsthetics, and as easily recovers its normal condition.

The former are evidently so important to the plant, that when, from some cause, one part cannot perform its office, another part has been found to supply its place, "coming to the fore" or retiring into the background, renouncing its own normal position to aid the "nutritive irritability" of the plant.

The folding of the leaves in the *Mimosa*, and *Acacia*, seems to partake of both the spontaneous and provoked irritability, and the stamens of some plants,—*Cactus*, *Cistus*, and others. As yet this mixed movement has been found rarely — if at all — in the female organs of any plant.

(*To be continued.*) S. M.

FIRST APPEARANCES.

This year, it is to be hoped, will be a more propitious one to insect-life than the last, with its dull and rainy days; such, at least, will be the wish of every collector. Certainly, the captures I have already made are a bit earlier than in 1880, my first moth then (*Amphydasis prodromaria*) being taken on April 4th, whereas this year the Clouded Yellow butterfly was seen on March 8th in many parts of the south of England. On April 2nd, this year, I first found the hybernated larva of the Swallow-tail moth (*Uropteryx sambucata*), although it must have come out of its winter confinement some days before. The larva of the Ermine moth was found early in March, feeding on ivy. On April 7th, I obtained a large ichneumon fly from a cocoon taken off a hawthorn bush; this insect had a very powerful pair of nippers, or mandibles, which looked dangerous, so I speedily killed and set him, before he could do any harm. A week later, bees and several beetles were tempted out by a few broiling hot days; the beetles were chiefly *Rhyncophora*, or Weevils, and *Brachelytra*. The Bright-line Brown-eye moth (*Hadena oleracea*) put in an appearance on April 16th, as well as the Large White and Brimstone butterflies, though probably there are earlier dates for the first appearances of the two last. I obtained from chrysalises, on May 17th and 19th, specimens of the Poplar-hawk and Lime-hawk moths, and on the 26th, a splendid imago of the Swallow-tail butterfly, as well

as the Sycamore-tussock (*Acronycta aceris*), the beautiful caterpillars of which may often be seen, crawling over the pavement, wherever there happen to be any chestnut trees. I found two Ghost Swifts, on June 3rd, just out of the chrysalis; they were in perfect condition, but I left them alone, as my series is already fairly good.—CHARLES E. M. INCE.

NOTE ON THE DISCOVERY OF CERTAIN PALÆOLITHIC WEAPONS & INSTRUMENTS AT CHURCH FIELD, WEST WICKHAM, KENT.

DURING the early part of this year (1881) I have had the fortune to find a group of rather curious flint weapons and instruments in a field, called Church Field, at West Wickham in Kent. Among the variously shaped wrought weapons were two of a pointed form, not greatly differing in outline and general shape from an almond, but of course much larger. There is also a part of another fine weapon of this kind, which, when perfect, was in all probability the best specimen of the three. Nearly one-third part of this flint, however, has been broken off, probably at the time when it was used, as the fracture of the broken part differs in no respect from that of the exterior of the weapon. Both fractures are evidently very ancient. The length of this weapon when in its perfect state must have been quite $6\frac{3}{4}$." The dimensions of the other two almond-shaped weapons are $5'' \times 3\frac{1}{4}$," and $4\frac{1}{4}'' \times 2\frac{1}{2}''$ respectively. The question as to the use for which these curiously-fashioned weapons were designed by our primeval ancestors is one which, when we remember how numerous were their wants and how few the appliances at hand to supply them, need not long occupy our attention, for it is evident that they may have been put to almost any use where a sharply pointed instrument could be of service, whether in war or for domestic purposes. It is probable that this form of weapon or instrument was fixed in a kind of wooden handle so fashioned as to carry the flint in somewhat the same manner as an axe or a hatchet. The smaller end was used for cutting and piercing, and the thick end for the purposes of a hammer.

Beside these weapons, I have found about 30 wrought flint flakes, some of which are well-shaped specimens, and give evidence of the skill and patience bestowed upon them by the workman. They differ from neolithic flakes found in this field and in adjoining fields, in their larger size, more boldly wrought outline, and more ancient *tout ensemble*. Among the remaining wrought flints are about half-a-dozen which I take to be scrapers, of various shapes and sizes, but all having one common feature, viz.; a more or less rounded outline produced by a succession of minor chips upon the edge of a large flint flake; the blows which formed these chips, having been given on one side, have thus produced

a sharp and fairly even edge. Instruments of this kind must have formed a valuable part of the limited stock of tools with which the workshop of the primitive artizan was furnished. Scrapers were doubtless employed for scooping out or finishing off articles of wood, bone, jet, &c.; for scraping roots for food, skins, &c.; and for many other similar uses.

These, together with a quantity of nondescript instruments which may have been used as scrapers or flakes, or for other purposes, complete the list of weapons and instruments which have hitherto rewarded my searches in this field.

The surface of the fractures of these wrought flints is stained more or less of a deep yellow colour. This colour extends into the flint, as a section exposed by an accidental modern chip shows, to an average depth of about $\frac{1}{20}$ of an inch. The surface is, moreover, very smooth and glassy—as most ancient flint fractures are—so that it is easy to distinguish that fracture of the flint which is ancient from that which is recent and the result of accidental or natural breakage, although the flint may have been subjected to long-continued surface wear.

From the peculiar regularity of the fracture observable on most of the wrought flints, it is evident that they were selected flints fresh from the chalk, as clean fractures can be produced only on such flints. The smallest of the almond-shaped weapons may be mentioned as being made of an exceptionally hard flint. One or two specimens, however, appear to be only second-rate quality of flint such as might be readily picked up in this field among the many various stones which have been naturally brought here.

The palæolithic weapons and instruments were all found near together and occupying a space about 100 yards across. The soil in which they were imbedded is a stiff ferruginous clay, which has stained the flints as described. The group of wrought flints was situated upon the side of the western bank of a small valley which runs through the field N. and S., and towards the S.W. corner of the field. Exactly *in* the S.W. corner, there is a small patch of sand with Tertiary pebbles, in which I have found only a few neolithic flakes and cores. Although the whole surface of the field is more or less thickly covered with flints, yet I have only met with *wrought* flints in those parts of it above mentioned. This in my humble opinion seems to indicate that the area covered by wrought flint weapons and instruments may have been at some time the site of a dwelling or dwellings, or at least a shelter of some kind (perhaps among the shades of the forest trees which doubtless covered this spot in days of yore), when the wild men and their families sought protection from the weather or from enemies.

After a consideration of these antique relics, one is naturally curious to know something of the occupation and mode of life of the men by whom they were made and used. Beyond the evidence of the wrought flints themselves, we have no data upon which to found an opinion, yet they seem to indicate that their former possessors were not unacquainted with warlike practices; and if the workmanship of their implements of

bone and wood bore any resemblance to that of some of the wrought flints, we may fairly assume that, taking into consideration the immense space of time which has elapsed, the condition of these people was not worse than we might expect. The absence of pottery should remind us, however, that their condition must have been one of great wretchedness.

It would be interesting if the former possessors of Church Field could be proved to have had any connection with the important tribe which formerly occupied the British Camp in Holwood Park, Keston, but in order to do this a thorough examination of that camp would be necessary. GEO. CLINCH.

SOCIETIES' MEETINGS.

HIGHBURY MICROSCOPICAL AND SCIENTIFIC SOCIETY.—July 2.—Excursion to Woolwich and Charlton. Director, Mr. B. B. Woodward, F.G.S.

NOTES AND QUERIES.

PARASITES ON HYDRA.—I hope more details will be forthcoming about the parasite (?) on *Hydra fusca*. . . . It is clear that the form noticed by Mr. B. B. Woodward is the same as that seen by the "Science Gossip" correspondent. Without presuming to give any new information, I would remind you that three species of parasites are known to occur on Hydra, viz.: *Oxytricha pellionella*, *Kerona polyporum*, and *Trichodina pediculus*. Years ago, I observed the last named, which is a modified Vorticella, on Hydra; and yesterday I got a specimen of *Hydra viridis*, on which are more than 30 individuals of *Trichodina pediculus*. The figure you give looks like *Kerona*, while the description given in "Science Gossip" suggests an *Oxytricha*. These two latter are simpler forms of Infusoria than vorticellidæ. I do not consider the creatures to be really *parasites*, in the strict meaning of that term, as they do not live on the substance, or at the expense, of their host; they simply make the surface of the Hydra their dwelling-place, and procure their food from the surrounding water like other Vorticellidæ. Perhaps they should be called *commensal*: but even that term does not quite apply, because they do not eat of the same dish as the Hydra, and because they are no more commensal with Hydra than are their allies, which are attached to plants, commensal with such plants. They are really *lodgers*, who find their *own board*. A. RAMSAY.

DROSERA ROTUNDIFOLIA.—Keston Common has been already brought before the notice of readers of NATURAL HISTORY NOTES, as a locality notable for several curious and interesting desmids and diatoms (*vide* N. H. N., First Series, Vol. I., pp. 43, 44, and Second Series, Vol. I., p. 48, *et seq.*). It is interesting, also, as being a spot where the Sundew (*Drosera rotundifolia*) grows in great abundance. Thinking that some readers of this Journal may wish to possess a living specimen of this wonderful little insectivorous plant, I beg to say that I shall be happy to forward one specimen to any one sending to me his name and address, a box (about 1½ inches square), and sufficient stamps to cover postage. GEO. CLINCH, Hayes, Kent.

CAT AND DOG.—The following curious anecdote was told me by a friend, who kept a cat and dog who were great friends. The cat had a kitten, and whenever Mistress Puss went out, the dog would mount guard over the basket, and never leave it till she

returned. One evening, the cat did not return as usual, and the dog, instead of going to his own bed, kept guard over the kitten. Next morning at breakfast time, the cat appeared, looking rather sheepish, and the dog, instead of welcoming her as usual, mildly but firmly took her by the scruff of the neck, administered a gentle shaking, and dropped her into the hamper along with her offspring. The cat did not repeat the offence. B. B. W.

COURT OF QUEEN LILY.—I was once present at the court of Queen Lily, at a grand reception. I was up late on a bright full-moon night, with window open, and noticed a fine group of lilies (white), beautifully illuminated by the moon-beams. I went into the garden to take a closer view, and there saw innumerable moths, dancing about the lilies and paying homage; they were of various dimensions, some perhaps half an inch in length, others the tiniest specks, and *all white*, or very pale in colour. It was a beautiful sight, and I hoped to have seen it again, but the nights following were cloudy, and meanwhile flowers and moonshine had departed.

G. H. W., Torquay.

ODOUR OF GYRINUS NATATOR.—If "Aquarius" will turn to Rye's "British Beetles" (1866) p. 66, he will see that all the Gyrinidæ have the "power of exuding a very nasty smelling, acrid, milky fluid, from nearly all parts of the body apparently, when handled." B. B. W.

ODOUR OF SOME OF THE COLEOPTERA—PROTECTIVE AND ALSO SEXUAL.—Some five or six years ago, when staying at Candilli, on the Bosphorus, some young people kindly sent me a very fine specimen of the famous "Beetle of the Bosphorus." Opening the box, there lay the splendid creature, fully two-and-a-quarter inches in length. Admiring the rich dark blue and iridescent colour of the back, thorax, wing-cases, &c., I took the beetle in my hand, very gently. At once I heard distinctly a sharp report, a tiny explosion, and the room was instantly filled with a loathsome odour, a strange and horrible compound of sweet, sour, acrid, and animal perfumes; and it took three or four hours to purify and ventilate the large Turkish room. Unpleasant as are such odours, and therefore protective as regards foes or strangers, they are well known to be attractive to the opposite sex of the same species of insects or other animals. In collecting some kinds, the one possessing this odour is frequently made use of to attract its fellow. S. M.

MIDSUMMER EVE.—Among the various curious superstitions which were in olden times connected with Midsummer eve, is one of some interest to the naturalist. It was anciently supposed that the spores of ferns, gathered at that particular time, had the wonderful effect of rendering certain persons invisible. It is difficult to assign any reason for such a curious belief, unless, perhaps, it may be owing to the minuteness of the fern spores, which, being themselves invisible, were supposed to make other things invisible also. This superstition is referred to by Ben Jonson in one of his plays, and by Shakespere in his "King Henry VI., Part First Act II., Scene I., where he says, "We have the receipt of fern seed to walk invisible.—GEO. CLINCH.

EXCHANGES.

(*The fee for insertion in this column is at the rate of* 1*d. per line*).

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Natural History Notes.

EDITED BY

FRANK J. ROWBOTHAM.

AUGUST, 1881.

TRAVELLING PLANTS.

CONTINUED FROM PAGE 60.

THAT which is called the *spontaneous* movement, is of the greatest importance to plants, as the movement of our lungs, the circulation of the blood, the beating of the heart is to ourselves. Motion of the limbs, tongue, eyes, &c., may be arrested for a considerable length of time; while the vital powers are endangered, if the lungs suspend their office for a moderate period, and, the heart's motion ceasing, death ensues.

It is to insure these important vital movements remaining uninterrupted, that, in case of such an occurrence threatening one part of a plant, another portion will run to the rescue, and *adapt* itself to the required circumstances.

As an instance of one portion of a plant coming to the aid of another (in speaking of "special adaptation"), Darwin says: "We are led to believe in adaptation, when we see the hypercotyl of a seedling, which contains chlorophyll, bending to the light; for although it thus receives less light, being now shaded by its own cotyledons, it places them — the more important organs—in the best position to be fully illuminated. The hypercotyl may therefore be said to sacrifice itself for the good of the cotyledons, or rather of the whole plant. But, if it be prevented from bending, as must sometimes occur with seedlings springing up in an entangled mass of vegetation, the cotyledons themselves bend so as to face the light; the one farthest off rising up, and that nearest to the light sinking down, or both twisting laterally."

This is exactly what occurs in animals, human and other one organ will be *moral* and "self-sacrificing" enough, to perform the office for another which may be temporarily disabled; the skin will perform the office of the kidneys, *pro tem.;* and the heart will do double work to help the skin and the lungs.

According, therefore, to the requirements of a plant—its need of light, moisture, heat, cold, or position, on or away from the surface of the earth, or from some annoyance, injury, or obstacle to its growth,—are the moving powers regulated or "*adapted.*" But, as in the case of "insufficiency of instinct" in animals, leading them to perform useless movements—such as that of a hen brooding over sham eggs; or an insect continuing to place food in a cell ready for the larvæ, when they have been removed from the cell by human, or other agency,—so we see "insufficient instinct" in the movement of the filament of a stamen when all the pollen has been shed, or removed, and the anther has begun to wither.

Now, at a very early period of scientific research into the subject of the movement of plants, many theories were invented to explain in what parts of a plant the power of motion resided, and analogies were early drawn between these parts and the muscular, and nervous portions of animal structures. The drooping of leaves at night; the leaf-movement of *Dionea Drosera*, *Mimosa*, &c., were the first observed, because they were the most *conspicuous* movements of plants. For a long time, leaves were supposed to be the sole possessors of the power of motion. Then the irritability of certain filaments of stamens, their response sometimes with marvellous rapidity to various stimuli; to the touch of a hair, bristle, or needle-point, and to the antennæ or proboscis of insects; was next observed, and, in both these cases, the presence of spiral vessels led to their being considered as analagous to striated muscular fibre.

Nerves were sternly denied to plants. Experiments fairly showed that a nervous system, properly so-called, did not belong

to plants. But the lower animals—the lowest, such as the amœba—were found to possess senses without any sense-organs, digestions without stomachs, vision without eyes, and will (*volition* sounds less human than will), volition without soul or mind, and powers of counting without the "organ of number"!

The *Actinophrys sol*, for instance, has been known to take a given number of journeys to and from some decaying organism containing, we will say, eight atoms of starch or chlorophyll, and to take eight excursions and no more. Volition has been shown to exist in atoms of protoplasm lying side by side, and brought up by the same dredge from the deep sea. One atom, totally undistinguishable from the other, under the highest powers of the microscope, has been found, not instinctively *to secrete* stony or shelly structure, as do the coral polyps (to the secretion of which structures the word *building* is so ignorantly or carelessly applied)—but to *choose*—one such atom of protoplasm, to *build* a case or tower of globigerinæ; another, by its side, building its tower of orbiculinæ, and a third of grains of sand; the latter selecting for its domed roof to each compartment only those grains (colored) of sand that contained iron. If the protoplasm of these creatures served them as senses and nerves, might it not be the same with plants, and might not their cell contents be undifferentiated nerve-matter?

Oken, and others, considered protoplasm as "diffused nerve-matter;" the former asserting that so far from nerves being the *last* organs to be developed in the animal kingdom, they were the first;—in fact, that brain preceded body; this diffused, or undifferentiated, nerve-matter becoming gradually condensed, or concentrated, in lines and masses, forming ultimately true ganglion and nerve-centres.

Experiments made on the *Dionea*, as well as on the cell-contents of many other leaves, showed the fluid agitated polarized under the influence of a galvanic or electric current brought to bear on them, the molecules of protoplasm oscillating

in a most singular manner, and this was stimulated, if not induced, in the leaves of the *Dionea*, by insect agency; that is to say, that, when a fly was imprisoned between the leaves, and the fly moved, the needle of the galvanometer was visibly deflected.

Thus, movement occurs in plants, beyond that incidental to growth, such as the gradual rising of the sap, and circulation of the nutritive fluids, as can be so easily seen under the microscope in a section of the *Valisneria spiralis*, deprived of its cuticle; or in thin leaves, blades of grass, &c., when held up before a very strong light.

This discovery was of importance, as the filaments, stamens, and, indeed, every part of a plant, having been morphologically proved to be but modified leaves; and the movements having been considered hitherto as analagous to muscular movement, or, merely (where spiral or annular vessels occurred), as due to capillary attraction, the point was reached when it could be clearly stated that the protoplasm in every cell, or surrounding every cell (spiral or other), was itself the source of motion,—the undiffused, undifferentiated, nerve-matter.

The germinating seed, the radicle, then the true root contained a power of motion, and of passing it on to the cotyledons, plumules, leaves, &c.

The evolution of circumnutation (if I may be "regardless of expense" in syllables), can be studied now to advantage, by examining the lower, and microscopic, organisms, and their movements, from the quivering and vibrations of the monads—*protistæ* ("neutral monads") of Haeckel, of Germany, which are, as their name implies, utterly inseparable into animal and vegetable, or even mineral (?) monads and atoms,—on to the Desmidiaceæ and Diatomaceæ, and thence to the cells and spiral vessels of the higher orders of plants.

This can be well studied under the microscope, with such lower vegetable organisms as the *Oscillatoria*, *Volvox*, *Bacillaria*,

Spyrogyra, &c., &c., the movements of which, consequent on the oscillation of the fluids in the cells, and the arrangement of the cells in lines, spirals, &c,, can be accounted for somewhat satisfactorily.

This protoplasm, in all organisms, whether it exist as cell-contents in plants, or nerve-matter in animals, seems to require *rest;* and, as a rule, darkness induces this rest, for motionless monads can be seen, under the microscope, to be set in motion by a ray of sunshine brought to bear upon the glass cell containing them ; and this may account for the fact that, "while every part of a plant is growing, and, in some cases after growth has ceased, it should have its cells rendered more turgescent, and its cell-walls more extensive, first on one side and then on another, thus inducing circumutation."—(*Darwin.*)

All these movements are deeply interesting, and many are by no means difficult to watch. Those who have gardens, and merely lounge about, or shiver round them when they take their daily "constitutional," would be amazed and delighted at the world of moving wonders presented to them, even to the naked eye.

I have seen intelligent men and women surprised, at being shown the sensitive movement in the flower, the stamens of the common Barberry, that for years had glorified and illuminated their gardens with its golden masses,—their attention never having been trained to look lovingly and reverentially into the very heart of hearts of Nature. Londoners, who now have tons of flowers, wild and cultivated, brought every hour to their very tables, could aid the advance of this branch of scientific research, if they would only observe, as well as arrange and water, their flowers ; for they have both cut-flowers, and those still "a-growin-and-a-blowin" in pots, in each of which the movements can be studied.

(*To be continued.*) S. M.

PLANT-SUPERSTITIONS.

In every age there have been writers who have ascribed more to Nature, than the laws of her existence permitted her to perform. Men of thought are prone to place too much reliance on their own wisdom. While philosophers denounce superstition, they oftentimes indulge in the wildest flights of credulity.

Early English literature consisted chiefly of works on alchemy, astrology, magic, and legerdemain. A higher tone of thought and literature was adopted by some few writers, but it was not until the Elizabethan age, that any great change was made. Hooker instituted a new order of English prose; Spenser further enriched English verse; the immortal bard, Shakespeare, perfected the drama; whilst Bacon opened up a new method of philosophy, whose practical fruits have since permeated English society. With much intellectual enjoyment from these writers, we turn now to "The English Physician, by Nicholas Culpeper, Gent., Student in Physic and Astrology," —a work written in a choleric vein and full of conceits, with little power beside that of punishing credulous persons. In his preface, the author apologises for presuming to treat upon the subject, on the grounds that "neither Gerrard nor Parkinson, or any that ever wrote in the like nature, ever gave one wise reason for what they wrote, and so did nothing else but train up young novices in physic in the school of tradition . . . . But in mine, if you view it with the eye of reason, you shall see a reason for everything that is written, whereby you may find the very ground and foundation of Physic; you may know what you do, and wherefore you do it; and this shall call me Father, it being (that I know of) never done in the world before." Culpeper, like other old herbalists, professed to read in the harmony of nature, the influence of stars upon herbs, and thence their proper application for the cure of diseases. Every disease was caused by a certain planet, and could be cured by the herb of its opposing planet. Diseases might also be cured by sympathy.

The Egyptians attributed a great influence to the heavenly bodies over the health of men; and divided the human body into thirty-six parts, all of which were consecrated to so many gods or demons, who were the authors of health or disorders, in the respective parts they had under their control. To propitiate these supernatural beings they offered up prayers and incantations. They also thought these demons might be reconciled to them by engraving hieroglyphics on herbs and stones.

The practice of Egyptian physicians was not so much directed by any real judgment they themselves had in physic, as according to a standard written law; from which it is reasonable to conclude that their theory was fixed; that memory had a greater share in it than the judgment; and that the physician could not, with impunity, go beyond the bounds of the sacred books.

The Egyptians used frequently to retire to the temples of Isis and Serapis, where they expected remedies would be revealed to them during their sleep.

The nature of a great number of plants was doubtless known to the ancients. Solomon was so strongly addicted to the study of plants and herbs, that he is, in Scripture, said to have known them all, from the cedars of Lebanon to the hyssop that grows upon the wall. Little, however, is known of the state of botany during the period that elapsed between the time of Solomon and Hippocrates, who is regarded as the great founder of physic Hippocrates gives the names of plants most known at that time among the Greeks, with accounts of their uses and virtues; but he left their description to Craterus. Dioscorides, however, charges both Craterus, and Andreas Medicus, his contemporary, with having left many useful roots and herbs imperfectly described. Theophrastus was the author of "eight books concerning the causes of plants," only the first six of which have reached our hands. He is said to have had two thousand disciples at one time.

In the time of the Anglo-Saxons, numerous laws were issued

against the worship of the sun, the moon, mountains, rivers lakes, and *trees*. However successful the emperors and the *Witanagemot* may have been in destroying the ceremonial worship of our ancestors, herbs continued in great esteem, and were the sole remedies employed in the curing of diseases, till long after the Norman conquest. The root and the herb, the fruit and the flower, each possessed peculiar properties, when accompanied by the spells of the magician, which were implicitly believed in, though not always verified by experiment. In many instances their qualities were founded upon tradition, and tacitly recognised. Each plant was supposed to bear witness to its own virtues. Certain peculiarities of structure and growth, and the similarity of names, afforded evidence as to the sympathies and antipathies of the plant. The deep reverence in which the herb was held, resounds in the quaint rhythm of the witch-verse :—

"Hail to thee, holy herb !
Growing on the ground ;
On the Mount of Calverie
First wert thou found.

"Thou art good for many a grief,
And healest many a wound ;
In the name of Sweet Jesu
I lift thee from the ground."

Several of the herbs, which were regarded with terror by the uninitiated, were employed as anodynes and soporifics. It is probable, that some of the superstitions regarding them were circulated by men who had discovered some peculiar property which made the herb useful in the cure of certain maladies. The Mandrake, a species of the *Solanaceæ*, or nightshade tribe, possessed valuable medicinal properties, which were known to the ancients. The Romans made it the subject of a mystic ceremony. The person, employed in taking the plant from the ground, stood with his back to the wind, drew three circles round the root with the point of a sword, poured a libation on the ground, and commenced digging it up. The mandrake held

an evil reputation among poets. It was believed that "whoso gathereth the mandrake shall surely die." Concerning this superstition Sir Thomas Brown writes, in his "Vulgar Errors": —"It is asserted that there follows a hazard of life to them that pull it up, that some evil fate pursues them, and that they live not very long thereafter." He speaks of the weird ritual of the Romans, as "a conceit not only injurious unto truth and confutable by daily experience, but somewhat derogatory unto the providence of God; that is, not only to impose so destructive a quality on any plant, but to conceive a vegetable whose parts are so useful unto many, should, in the only taking up, prove mortal unto any. This were to introduce a second forbidden fruit, and enhance the first malediction, making it not only mortal for Adam to taste the one, but capital for his posterity to eradicate or dig up the other."

It is mournfully interesting to note how these old writers themselves struggled hopelessly against superstition. Sir Thomas Brown was examined before Sir Matthew Hale, upon a witch-trial. He gave out that the devil acted upon human bodies by natural means, namely, by exciting and stirring up the super-abundant humours; he did afflict them in a most surprising manner by the same diseases their bodies were subject to; that they might be natural, only raised to a great degree by the subtlety of the devil, co-operating with the malice of witches. This was truly "a conceit not only injurious unto truth, and confutable by daily experience, but somewhat derogatory unto the providence of God," from which the author of "Vulgar Errors" was not exempt.

Consumption, gout, dropsy, and the many complaints to which flesh is heir, were presumably eradicated by the treatment they received from these old herbalists. Purgatives and antispasmodics were also resorted to as means of discomfiting supernatural beings.

(*To be continued.*) W. E. BOWERS.

CHEDDAR—ITS CLIFFS AND CAVERNS.

The picturesque little village of Cheddar, situated at the foot of the Mendip Hills, in Somersetshire, is a quiet straggling little place, and the casual observer, passing through by rail, would probably see nothing to admire or to tempt him to delay his journey in order to visit so quiet a spot. He might possibly remark, "Ah, this is where the cheese comes from," and think no more of it; but in reality Cheddar is rich in natural phenomena, and to the geologist offers great attractions. The climate is very mild—severe frosts being almost unknown—although bracing and invigorating air can be obtained by climbing the hills.

The first attraction to the geologist would, of course, be the cliffs (though I suppose, according to Mr. Whitaker's definition, they should be called *escarpments*); these are formed in the mountain limestone, and form what may be termed a serpentine gorge, the sides rising in places to a height of nearly 400 ft. Their origin has caused some variety of opinion. Mr. Boyd Dawkins believes them to be due to the removal of the roof of a gigantic cavern. Mr. Horace B. Woodward, in a paper on the "Geology of the neighbourhood of Wells and Somerset," says, "they have evidently been *worn away*, not disrupted by any great convulsion as popularly supposed. The dip of the strata on either side of the gorge coincides, and though possibly some crack which occurred during the elevation of the hills may have given the direction to the cliffs, they are clearly the result of gradual wearing away, of denudation, the result of the action of water." He can see no trace of the action of the sea, as asserted by Mackintosh, in the "Intellectual Observer," vol. xii., p. 30.

Now, I should be very sorry to differ from so high an authority as Mr. Woodward, but I must say that I do not think the gorge was formed entirely by the action of water. The local idea is that it is the result of an *earthquake*, and although I am opposed to the school of catastrophists, and would much rather accept a theory from the uniformitan side, I am rather inclined to agree with the local tradition, for the following reasons. First, the sides of the gorge seem to correspond,—that is to say, where there is a protuberance one side there is a corresponding *recess* on the other, which gives one the idea that if we could by a giant hand push the two sides together, they would fit into each other. Secondly, the angles are sharp and well defined, and do not present that rounded appearance which would result, in my opinion, if they were formed by a stream of water; and, thirdly, I do not consider there is sufficient high land at the back of the gorge for the drainage to give rise to a stream of water of sufficient volume or force to produce such a ravine. If, however, the stream really did exist, as it is maintained, it would be interesting to know why it does not still flow down the gorge. In putting forth these crude ideas, I trust I shall not be thought presumptious,—my desire being to elicit information on the subject.

The caverns are very interesting; the most important of them, called Cox's Cavern, is about 300 feet in extent, and consists of five or six chambers, branching right and left from the main passage. The stalactites here are very beautiful, forming most fantastic shapes. This cavern was discovered by Mr. Cox, in 1838, while excavating for building purposes; it is lighted by gas, and very pretty effects are caused by the attendant lowering the flame; by looking into the various pools of water, one gets a very good view of the roof and sides of the cavern. The members of the British Association visited Cheddar, on the occasion of their meeting at Bristol. T. B. L.

VITALITY OF MOLLUSKS.

MANY years ago, I was shown, at the British Museum, a snail that had created some interest by the fact of its having "come to life" (if the expression may be permitted) after having been, apparently, dead for about four years or more.

One morning, it was observed that the slip of white-papered mahogany, on which one had been cemented for all these years, labelled as dead,—*hic jacet Helix desertorum*,—was smeared all round the mollusk, which was therefore removed, and placed in warm water, when it was discovered to be alive, and apparently none the worse for its retirement from active life.

Now six years ago, during my travels in Turkey, Asia Minor, the Troad, Greece, &c., I constantly collected land-shells, and each set I placed apart in separate boxes,—writing immediately, inside the lid, the name of the place whence they had been taken.

To many thus hurried alive into captivity, I resolved to give a chance of life, or quickly to kill, at the first opportunity.

Anxiety concerning my fellow traveller, and other grave cares, drove the matter from my mind. As each summer drew nigh, I resolved to examine the snails. I use this word, as it is the term which is generally and carelessly applied to all land mollusks. But each summer passed, and winter set in, before I remembered my prisoners; and in winter I would not attempt to restore them. Frequently I opened the boxes, and looked at their contents, and never, at any season, cold or hot, did I see signs of any individual having looked from his home, or investigated his prison.

Towards the end of May, I fortunately stumbled upon the box containing *Cyclostoma*, *Clausilia*, and *Helix*. I took six of the *Clausilia vibex*, obtained from the stones and walls of Athens, and placed them in warm water. Two, in the course of a few hours, emerged, seeming to have lost nothing in bulk, and to have preserved their normal condition; for they began at once to eat lettuce, with which I supplied them. They have been now several weeks apparently well, and contented.

As their name implies, they can retire into their shells, which are nearly closed at the mouth by a shelly spiral arrangement. When they withdraw into the whorls most remote from the mouth, they are virtually as closely shut in as if by an operculum, or by their own hardened secretion.

It would be interesting to try the experiment with both land and salt-water mollusks, noting carefully whether this vitality was generally associated with the possession of an operculum, or by any power of closing the mouth or valves by any structure similar to that possessed by the *Clausilia vibex*.

Many of the curious phenomena to be observed in snails, and possibly this power of remaining apparently dead for years, were probably known to the ancients.

Oken, the great philosopher, in his Physio-philosophy (Ray Society), has a very curious passage about the snail.

He dwells enthusiastically upon the beauty, majesty, and dignified movement of the snail. Certainly, there is much symbolism connected with the snail, as is well

known to the "initiated student" of religious and solar myths, and Oken was aware of this, concluding by calling attention to the use made of it by the old masters in their paintings, as they were lovers of symbolism; and Oken exclaims enthusiastically: "When we see a snail . . . do we not imagine we see the prophesying goddess herself, seated on her tripod?" I confess this does puzzle me not a little.

S. M

NOTES AND QUERIES.

BRISTLES ON THE TAILS OF CHRYSALIDES.—The other day I had an opportunity of observing the use of these bristles. After examining a chrysalis of *C. caja* (the Garden-tiger), which I had removed from its cocoon for that purpose, I replaced it, and the next day when I happened to look at it, I found the tuft of bristles was firmly fastened to the meshes of the cocoon. Wishing to know whether this was an accident, or was produced by the wriggling of the creature's abdomen, I removed the chrysalis, and again replaced it. The next day, however, it had fixed itself as before. The object of this appears to be to prevent the chrysalis shaking about, especially if the cocoon happened to be injured. This tuft is well developed in C. *caja*, which spins a very slight and delicate cocoon—partly made of its longest hairs, which it cuts off short for the purpose, and interlaces with its web. It is naturally missing in the pupa of the Puss moth (*Dicranura vinula*), whose cocoon is as hard and unbreakable as a solid piece of wood. Neither is it found in that of the Poplar Hawk (*Smerinthus populi*), nor in those of other moths which pass their pupal stage under similar conditions.

E. H. H.

"DEAD OR ALIVE."—A LADY, lately returned from Leipsic, relates that, when out marketing one day, she purchased an eel, previous to placing which in her basket, the salesman cut off the head (it being alive at the time) and hacked it all along the body. Even in this condition it wriggled so much that its purchaser had the greatest difficulty in getting it home, and when placed in the frying pan it tried to jump out. The same lady also relates that in Leipsic a jack which was caught, after being *cleaned out*, was placed in a saucepan of *boiling* water, when it instantly gave a terrific jump out on to kitchen table—to the fright of the mistress. I have never heard of such vitality in *English* fish; on the contrary, the fault we English housekeepers generally find is that they are *too dead*.

C. E. F.

SPORT IN GERANIUM.—I noticed a peculiarity affecting the flowering stems of some red geraniums in my possession, viz.:—From the top of the flowering stem, just below the flowers, several *leaves* have appeared just as they do from the leaf-stem. In one case, the leaves are stunted. Have any of your readers ever noticed a similar "sport" in the geranium?

E. A. R.

EXCHANGES.

(*The fee for insertion in this column is at the rate of* 1*d. per line*).

Two fine crested Cockatoo-Parrots (hens); just arrived from Australia. Will take 12s. 6d. each (usual price £1). Address, A. PHILLIPS, Mounthill, Epsom.

Communications for the Editor should be addressed FRANK J. ROWBOTHAM, 42, Loftus Road, Shepherd's Bush, London, W., and should reach him not later than the 15th of each month.

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Natural History Notes.

EDITED BY

FRANK J. ROWBOTHAM.

SEPTEMBER, 1881.

TRAVELLING PLANTS.

CONTINUED FROM PAGE 69.

THE anther of the freshly cut Barberry, will, on being irritated by a bristle or point, especially, but not exclusively, at the base, on the incurved side of the filament, incline towards the pistil.

Nay, the stamen can be entirely removed and, a portion of the cuticle being carefully cut away, the denuded spiral vessels can be seen, under the microscope ($\frac{4}{10}^{th}$ objective), to contract,—the rings or coils running together in irregular groups, wonderfully reminding one of the similar movement in striated muscular fibre.

And thus,—for the purpose of fructification, the stamen contracts, and moves towards the pistil; for the purpose of rest and growth, every part of a plant revolves upon its own axis, or "circumnutates." To obtain shelter from night air, and harm, leaves fold themselves to sleep, and from that sleep, can be disturbed, can have a "bad night," and turn in their bed into new positions, get up and fold themselves anew to rest; some, like any reporter for a journal, having been up all night, nod their heads and fold to sleep in the day; while the reverse having been the case with a comrade, it will wake up and expand by the side of the weary plant. [*Vide* Darwin on Movement in Plants.]

With the object of carefully setting their own seeds, many plants slowly bend their heads to the earth when the seed ripens; or bear them on the points of their branches or leaves, as in the case of some ferns, until the seedlings have grown to comparative maturity, and then carefully deposit their offspring on to the lap of the generous earth.

For the purpose of seeking, or shunning the light, leaves gyrate, first in one direction, and then in another, according to circumstances; and for the purpose of obtaining moisture, plants and leaves move towards a damp surface, and in order to scatter the seed, when ripe, there exist a thousand beautiful contrivances of "machinery in motion."

One plant has a curious peg, by which it splits its own seed-vessel open and scatters its contents. The slightest touch of bird, mouse, or beetle, or peasant's sweeping raiment, suffices to set this movement going, the seed vessels popping and shooting about, and thus setting others, on all sides doing the same thing, in a delightfully surprising way.

Who does not know the strange movement of the capsule of the *Noli-me-tangere*—the Impatiens? And, of all plant movement, is there anything more lovely and graceful to witness, than that of the tiny incurved, often ruby-jewelled fingers that guard the border of the cup of many mosses, and hold the spores safely within? Breathe on them, and the lovely grasping fingers, that had been jealously guarding their treasure from being wasted on the dry air, will now, with elastic motion, bend upwards and outwards, and, by the sudden raising of their incurved points, will lavishly scatter the spores on to the warm moist atmosphere.

And, finally, the root,—apparently motionless, loving darkness rather than light, but not because of its evil deeds,—what of the root?

Every portion of the root, too, is in motion, and full of purpose. It seems to be a mere congeries of cells of Protoplasm. But we take our hats off now-a-days before this word, which we owe to the philosopher Oken. What is it? What is it *not?* Where does it *not* exist?

Is it really the undifferentiated brain? Certainly, it seems so in the radicle, the tip of which [Darwin] is endowed with extraordinary sensitiveness, while, a little above the tip, Sachs found great sensitiveness, and did not think such existed at the apex; but, in reality, both philosophers are right, and their seeming difference of opinion leads to a most interesting discovery concerning the root; a discovery of almost startling importance. The tender and delicate root must push its way underground, and in some cases travel bodily in search of "fresh fields and pastures new," avoiding hard or harmful obstacles in its way. It must not be injured at the apex, for the root must be the guide, the very brain of the plant.

The sensitive apex must shrink or turn away from even a slight touch. It must have room all round it, its own private little chemical laboratory, where it experiments on the constituents of the soil by means of gummy and other secretions. On its journey underground it is helped by its delicate hairs to hold on to one support, or to push on elsewhere; but the sensitive part of the

root, at a small distance from the apex, is its most important aid, because it is sensitive in an exactly opposite manner.

The apex, when touched, shrinks away *from* the obstacle; the part *above* the apex, when touched, bends *towards* it, thus giving leverage to enable the apex of the radicle to move away from what would injure it. This is the only case of an organ bending from an organ touching it, as tendrils [Darwin] for example, when touched, seem stimulated by this "frictional electricity" towards the object, to cling and twine round it, and, according to some, the rougher the object, the more strongly will the branches or tendrils twine round it.

"It is hardly an exaggeration to say, that the tip of the radicle, thus endowed" with sensibility, "and, having the power of directing the movements of the adjoining parts, acts like the brain of one of the lower animals, the brain being seated within the anterior end of the body, receiving impressions from the sense-organ, and directing the several movements."—*Darwin.*

Our travelling lilies show their brains, then, by going on their little voyages, and being their own locomotives. And they have their slow and fast trains, as we see they travel at different speed according to their requirements,

From the friend, whose first question "DO lilies locomote," suggested a rather lengthy reply in this article, I have received the following list, kindly supplied at my request :—

Lilium candidum - -	Scarcely at all.
„ *longifolium* - -	
„ *martagon* - -	Very little; hardly obser-
„ *pyrenaicum* - -	vable.
„ *Davuricum* - -	Rather more, but not much
„ *tigrinum* - - -	out of bounds.
„ *auratum* - - -	A good deal.
„ *lancifolium* (alias *speciosum*) - -	Most of all.

"*L. auratun* and *lancifolium*, are prone to send out off-sets—perhaps their movements may be due, *in some cases*, to the struggle between parents and offspring for the best places—but they *move*, whether they send out off-sets or not."

As the insectivorous plants turn their leaves to where there are most insects to be found (renouncing even sunshine for this purpose)—so, depend upon it, the root travels with some definite plan of the route, and our enemies the slugs may even aid them; for, if their favorite morsel be a bite from the juicy tip of the radicle, the tip turns away in disgust, and seeks a new direction.

thus stimulated to travel, as men are when their nervous systems have received a shock. Roots will run along the surface of some hard obstacle, and drop over the edge of it into some old furrow, formed by worm or other means, or by circumnutating and oscillating will burrow for themselves a way to that which they seek. As, among the molluscs, the *Pholas* will exude an acid to help it, as, by revolving its rough but delicate shell, it burrows through the hardest rocks. It is, doubtless, to reach certain chemical constituents in the soil, that lilies travel; just as the tap-root of the wheat in dry seasons penetrates to many feet in depth, and so enables the plant to live and thrive, when the surface of the earth is parched with drought.

That this travelling is not confined to lilies, is known by the phrase—"Oh, our tulips, hyacinths, &c., &c., planted under the trees, come up all over the garden!"

Much can be done by amateurs who will patiently watch their plants, and simply send notes of what they faithfully and carefully observe; from the nodding to sleep of the flowers in their drawing rooms in pots,—the effect on them of gas, sunlight, darkness, draught, or still air, or from the effects on them of the electric light, as it streams on their windows and small London gardens.

There is delightful work for a lifetime, even in great, crowded cities, and some of the most extraordinary phenomena of plant and animal life present themselves to the view of him who has eyes to see, even in the most apparently unpromising quarters of our towns.

"Ah, me! what a strange planet this is! So many wonderful and beautiful things to see, and such small brains, and such a small drop of time for the purpose!

"And many of the small minority who have some little faculty of vision, immured for the most part of their lives in dens and caves of mammon, till their eyes grow dim and their drop of time almost exhausted." S. M.

NOTES ON SUNDEWS.

It is my purpose in the following notes, to give the results of a few experiments which I have been making recently, with a view to discover some of the wonders of those interesting little plants called Sundews.

It is generally well-known that Sundews, together with other plants, possess the remarkable power of catching, killing, and

eating insects. The object of my observations, therefore, has been to watch, and note down, the changes that take place in the leaf during this process, and other interesting facts connected therewith. For this purpose, I obtained about a dozen plants from Keston Common, Kent (where the Sundew grows in great abundance), which I placed in a shallow dish, half filled with water. This dish I put outside my window, where the plants have grown well and are still flourishing. I have given them no protection from the weather, as I noticed that the spot at Keston Common where they seemed to grow best was one exposed to the rain and sun. I commenced to feed the plants by placing the head of a freshly-killed house-fly upon one of the little hairy leaves, which lay quite open in apparent peacefulness and tranquility. In about fifteen minutes, I observed a few of the tentacles (or small red hairs with which the upper side of the leaf is covered), gradually bending round the fly's head. About four-and-a-half hours after this, the leaf itself was slightly folded, and four hours later nearly all the tentacles had fastened themselves on to their prey, upon which they continued to feed diligently for two days. In looking over the rough notes which I made at the time, I find that five days after depositing the fly's head on the leaf, I wrote the following :—"June 27, 12.0 noon. All tentacles open. The head is expelled from the leaf, and has been carried to the edge by one or two of the longer tentacles."

To other plants I gave portions of the same insect ; to one a wing, and to another a leg. I was somewhat surprised to observe, that the leaf to which I gave the fly's leg, retained its stiff and rigid position for about twelve hours ; but the following note, made at the time, will indicate the cause :—

Note.—"It is apparent that at least five other leaves of this plant have caught insects, which they have either consumed, or are now in the act of doing, hence the slow rate at which this particular leaf, which I have fed, eats the fly's fore-leg." This shows that the leaves give common support to the plant, and do not catch flies for themselves alone. I observed another interesting fact. It seems that the tentacles or hairs have the power of discerning whether the food that they catch, or that may be given to them, contains much or little nutriment, A remarkable difference may be seen in the rate at which a leaf will envelope a fly's head, and that at which another leaf will envelope a fly's *wing*. If the fly or insect captured by the leaf happen to be

very small, only a *few* of the tentacles bend over upon it, the rest remaining open ready to employ themselves upon any luckless fly that may fall in their way.

Upon one occasion, I noticed that the tentacles of a leaf which had only partly caught a small moth, had some difficulty in bringing the capture into the middle of the leaf. It happened that a long thin flower-stalk was growing close by. What was my surprise, when looking at the plant a little while after, to see that the flower-stalk had come close to the leaf, and was pressing upon the moth, as if by some mutual arrangement with the leaf in order to secure the prize for the general support of the plant.

GEO. CLINCH.

PLANT-SUPERSTITIONS.

CONTINUED FROM PAGE 73.

CULPEPER dwells at great length upon the marvellous properties with which plants were invested. As if conscious of the doubts which his wonderful statements may create, he says :— "I cannot stand to give you a reason in every herb why it cures such diseases ; but if you please to pursue my judgment in the herb Wormwood, you shall find them true throughout the book."

Wormwood is a herb of Mars, and, according to Culpeper, is calculated to effect the cure of a variety of diseases. Amongst other virtues, it "restores faded beauty ; mixed with ink it prevents the attacks of rats and mice upon the paper inscribed with it ; and laid among clothes preserves them from moth."

Culpeper describes Moonwort as "an herb which (they say) will open locks and unshoe such horses as tread upon it." In support of this, he says :—"I have heard commanders say that on White Down, in Devonshire, near Tiverton, there were found thirty horseshoes, pulled off from the feet of the Earl of Essex's horses, being there drawn up in body, many of them being but newly shod."

The Black Hellebore root was an effectual cure against all melancholy diseases, such as quartan agues and madness. It was also useful in the falling sickness, leprosy, jaundice, gout, sciatica, and convulsions. The Romans in taking up the root observed similar ceremonies to those which accompanied the

removal of the mandrake ; in this case, however, prayers were offered to Apollo and Æsculapius, for permission, and the operator turned to the East, on commencing to dig.

The Monkshood *(Aconitum Napellus)* of the cottage garden, grows to a height of three or four feet, the upper half of the strong stems being closely beset with hooded flowers, of dark blue tint, and leaves cut into narrow-pointed segments. Its poisonous nature has darkened its history, though it has possessed virtues which have rendered it serviceable, in the opinion of some old herbalists. The "Munkeshood" of Gerarde is good against the stings of scorpions, and "so forcible that the herb only thrown before the scorpion, or any other venomous beast, causeth them to be without force or strength to hurt, insomuch that they cannot mooue or stirre vntill the herb be taken away." It is to Gerarde's credit that he would have us hold in contempt this "with many other such trifling toies not woorth the reading." John Parkinson, while cautioning us against the poisonous properties of the plant, also gives us the "counterpoison-monkeshood," the roots of which "are effective not only against the poison of the poisonful helmet-flower, and all others of that kind, but also against the poison of all venomous beasts, the plague or pestilence, and other infectious diseases, which raise spots, pockes, or markes in the outward skin, by expelling the poison from within, and defending the heart as a most sovereign cordial." This antidote is the winter-flowering aconite, bearing a pale yellow flower, and known to later botanists as *Eranthis hyemalis*. It is a member of the Ranunculus family. Gerarde designates the plant as the "winter woolfesbane," and regards it as "very dangerous and deadly," and powerful against the bites of scorpions : "If the scorpion passe by where it groweth and touche the same, presently he becommeth dull, heauie, and sencelesse."

The Lesser Celandine (*Ranunculus Ficaria*) grows freely in damp spots, and often forms a dense carpet beneath the shade of trees. The plant derives its name, celandine, from the Greek word meaning swallow, from an old belief that the flower appeared on the arrival of the swallows and died at their departure.

(*To be continued.*) W. E. Bowers.

NOTES ON THE REPRODUCTION OF *CHARA*.

I WOULD point out to *observing* aquarium keepers, the interest attaching to the study of the fruit of this plant. To those who do not number *Chara* amongst their collection of aquatic plants, I would urge, *Try it.* It is an easy plant to procure, as almost every pond contains it in abundance. Its mode of growth (by cell-division at the apex,—see Figs. 5 and 6, Plate I.) is very interesting to watch, typical as it is of the Division Algæ of the Class Thallophyta, whilst its mode of reproduction is especially so.

About this season of the year, the branches of *Chara* may be noticed studded over with minute bodies, some dark in colour, others orange-red. These are the male and female organs of reproduction, called respectively *globules* (or antheridia) and *nucules* (see Plate, Fig. I.) The construction of the nucule consists chiefly of a doubly-coated *central cell*, around which a number of tubes are spirally arranged, so as to form a third coat (*cortex*),—the tubes ending in a crown of teeth at the apex of the cell (see Plate, Fig. 2). At a certain stage of development, these teeth separate, and so allow of a free passage to the central cell. "In this state we may compare the structure to an *archegonium*, or to an *ovule* of Phanerogamia."—*Henfrey.*

The globule is a spherical case, composed of eight triangular pieces or segments,* each of which is built up of a number of cells, radiating from a central one ; " all these have red or orange contents, imparting a colour to the globule, as seen in its natural condition."

Now, if you can imagine a number of matches projecting from an equal number of triangular pieces of wood (the latter representing the *segments* of the globule), and the pieces so arranged that the tips of the matches meet in the centre of the cell formed by the pieces, and if you further imagine that, just where the matches touch, a little mass of cells is situated, from which depend a number of slender, jointed threads, you will have a rough, but tolerably correct idea of the internal structure of the globule, or male organ of *Chara.*

When the period of maturation arrives, the eight segments of the globule *separate*, each carrying away with it its central cell

* In the sketches of globules and nucules I have given, it so happens that the segments of the former, and the spiral tubes of the latter, are invisible. Fig. 4, Plate I., however, shows three of the eight segments of a globule.

Plate I

Fig. 5

Fig. 1.

Fig. 6

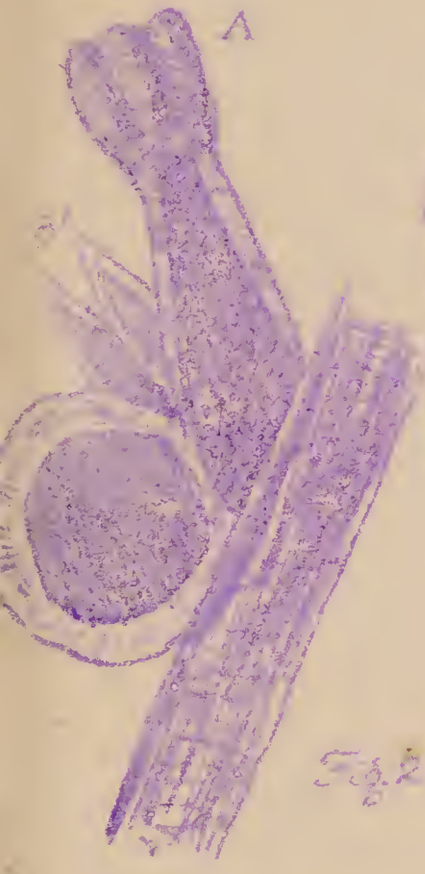

Fig. 2.

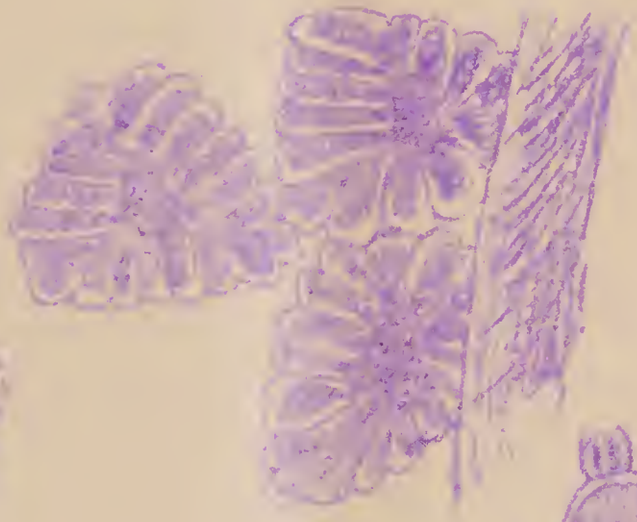

Fig. 4

Fig. 3.

Reproduction of Chara.

Fig. 1. Branch of Chara, bearing Nucules and Globules. (natural size)

Fig. 2. Leaflet, bearing A, Nucule (the teeth separated a little to give a passage down the side of the wall of the central cell). B. Globule (or Antheridium). A' B', sterile branchlets.

Fig. 3. Leaflet. B. Globule (cut through) burst, and emitting many coiled filaments. C, portion of four of the latter magnified, showing contained antherozoids, spirally coiled.

Fig. 4. Three of the 8 triangular segments of the Globule. (Mag.)

Fig. 5. Nucule, showing its mode of apical cell-division. (Mag.)

(which we have likened to the match), bearing at one end a tuft of the slender, jointed filaments before alluded to. Now, each filament is composed of a number of cells placed end to end, forming the *joints* of the filament. Each cell is seen, under a high power, to contain a "minute spirally coiled thread" (Fig. 3, C, Pl. I.), which in due time emerges from the cell, and is then seen to be a minute body, furnished with movable "arms" (or *cilia*). The *antherozoids* (as these ciliated bodies are called), are enabled, by means of their movable cilia, to reach the mouth of the nucule (female organ), the teeth surrounding which will now be open, and so to pass down into, and fertilize, the central cell.

The next stage is very curious, and is illustrative of the difference which exists between this, and the method of fertilization observed in flowering plants. The nucule, after being fertilized, *separates* from the parent stem, undergoes a period of rest, "and in the following season germinates like a seed or spore, and grows up at once into a new plant."

Besides the interest attaching to the study of reproduction in *Chara*, I might mention the "rotation of the cell-sap" which can be observed throughout the "unencrusted"* kinds, the "simple tubes of *Nitella* [a genus of Characeæ], and the young shoots generally." Nor should the relation which exists between the *Chara* of our ponds and the fossil *Chara* of the wealden, be forgotten in summing up its list of attractions.

HINTS ON COMMENCING THE STUDY OF BOTANY.

By Professor Boulger, F.L.S., F.G.S.

Botany is a science, therefore we must not deceive ourselves with the idea that we are studying botany when we make hasty, inaccurate notes on plants, when we enquire their names, English or Latin, from anybody else, or even attempt to find them out by comparison with pictures or herbarium specimens. Neither is the collecting and labelling of specimens in itself—though perhaps useful and improving—a scientific study, for science is systematised knowledge and scientific study, therefore, is systematic investigation.

Botany is the science of plants, not of plant-cells or plant-tissues, not of flowers, not of British plants only, not only of

* The stems, &c., of Characeæ often become encrusted with carbonate of lime, deposited apparently by the stagnant water in which they reside. This can, however, be removed by treating with dilute sulphuric acid before examination.

garden or of wild plants, not only of dried plants, not of plant-names nor of plant-distribution. It is a natural science, and therefore must be studied practically; for no books can represent the whole truth of any fact of nature. Theorise if you like; but do not waste pen, ink or paper on theories before you have examined many facts—for botanical theories, plants. The first requisite for the study of botany then is plants; and, now the country is brought into our midst in London, many common wild flowers can be easily obtained during the greater part of the year. On the whole, however, I consider Christmas the best season for commencing the study.

No human intellect can afford to neglect the results of the experience of its fore-runners; unguided study must long remain a mere groping in the dark. We should not altogether, therefore, ignore the assistance to be derived from books, especially if we are without the still more valuable aid of oral instruction. For young children I know of no better first book than Professor Henslow's "Botany for Children" (Stanford, 4/6), at once accurate, suggestive, wide in scope and simple in language. I have used Miss Youman's "First Book of Botany" (H. S. King & Co., 5/-) with success in teaching children of six or seven, and it will undoubtedly effect its purpose of cultivating the observing powers of attentive children; but it is less interesting and of a more limited scope than Professor Henslow's work in my opinion. Mrs. Kitchener's "A Year's Botany" (Rivingtons, 5/-) is far more interesting than Miss Youman's and is a more advanced book in some respects even than Professor Henslow's, though it does not pre-suppose any knowledge of the subject. It includes tables of natural orders and instructions describing flowering plants designed to aid candidates for the University "Local" Examinations. In the body of the work the authoress has, however, made what I consider a mistaken attempt to substitute for the technical terms of Latin and Greek origin already in use others of a popular character, which pupils find equally difficult, and less useful subsequently.

(To be continued.)

NOTES AND QUERIES.

Chrysalis of Vanessa Io.—Since the note about the bristles on the tails of some chrysalides appeared in this paper, I have had an opportunity of observing the means by which the pupa of the Peacock Butterfiy is suspended. The caterpillar, when about to change, spins a little tuft of silk on the underside of a leaf or stem of a nettle, and

then fixes its tail to it, and hangs downwards, waiting for its skin to slit up, when it wriggles out, and appears as a chrysalis.

A schoolfellow of mine had one which fell from its support; he took it up, and put its tail against the tuft of silk, when the animal gave a jerk and remained suspended. Wishing to know how this happened, I "microscoped" the tail of an empty chrysalis, and found the little spot at the extreme tip to be formed of numberless little *hooks*, shaped like thick walking-sticks. These were entangled and fixed in the matted silk so firmly, that the tail came off the chrysalis when I tried to remove it. E. H. H.

CHEDDAR.—On the occasion of the visit of the Geologists' Association to Cheddar Gorge last year, a long discussion was held as to the mode of its formation, which resulted in the almost unanimous conclusion that it must have been due to the same agency which appears to be making a branch gorge of the larger cave. This would account for the facts observed by T. B. L. The nature of the rock is another reason for the absence of the gently sloping sides seen in clay, and other soft rocks. There may not now be so much water as when the gorge was formed (owing to some alteration of the local drainage), but the present stream would perhaps be sufficient for the purpose. It must be remembered, too, that the stream is not seen except at the mouth of the gorge, and it may be even now forming an underground cavern which will in the future fall in, and so deepen the ravine. E. S.

SOLAR RADIATION.—The Rev. Frederick Howlett, of the Vicarage, Crosby Ravensworth, Penrith, writes:—"During the extremely hot weather of last month, I accumulated in my blackened wooden boxes with flat glass tops, a heat of no less than 228° Faht., or 16° over boiling water point, at the sea level; and cooked rashers of bacon and eggs in splendid style." [It would be interesting if Mr. Howlett would give us details as to the means by which he collected the heat he states, and of the apparatus he used for the purpose.—*Ed.* N.H.N.]

TWO-FOLD FUNCTION OF STAMENS IN HEERIA (*sp.*).—An interesting communication is given in NATURE (p. 307), respecting the different functions of two kinds of stamens in a species of Heeria (Melastomaceæ), as observed by Fritz Müller. The flower is so constructed, that "any large bee (like Xylocopa, Centris, or Bombus), when working on the smaller anthers in order to collect pollen, would, by moving the connective fork of the larger ones, press the apertures of the latter against the ventral side of its abdomen, and powder it with pollen." The colour of the anthers of the short and long stamens, respectively, is bright yellow, and red. The pollen of both kinds is white.

THE APPEARANCE OF GRAPTA C-ALBUM, &c.—I have heard that this butterfly has been found to be not uncommon this year in the Forest of Dean, Gloucester, although it was feared that it was becoming

extinct. I hope that other readers of this magazine will write if they observe a rare insect in a new locality.

As a proof of the rapid changes in insect development which have taken place, owing to the excessive heat, I bring forward the following fact. On Thursday, July 15, at Boxhill, I came across the Caterpillar, chrysalis, and imago of the Six-Spot Burnet (*Z. Filipendutæ*). The chrysalides were abundant on the stems of grass; tbe caterpillars were in the same position, about to spin; they all *changed within two days.* I only saw two specimens of the perfect insect, evidently newly out. I believe this rather uncommon fact occurs in the metamorphoses of a few other Lepidoptera; the Vapourer (*O. Antiqua*), for instance, is familiar to all. The caterpillar, brilliantly coloured, and adorned with tufts of hair, is seen on railings in every park in London; and the male vapourer, looking rather like a dry leaf, is often seen fluttering along the roads just out of reach of the little boys, for whose exercise and edification it seems especially to be there. The tufted hairs of this caterpillar, by the way, are beautiful objects for the microscope.

E. H. H.

Chamæleon.—In his recent lecture on the Chamæleon, Prof. Mivart says that, so far as he is aware, it is the only animal which possesses the power of moving its eyes independently, Has not the Sea-horse (*Hippocampus*) a similar habit? I have a remembrance of watching a number of these curious little creatures, but have no note of the fact. Perhaps Prof. Mivart, in this instance, uses the word *animal* in a more restricted sense? On referring to Gosse's "Natural History of Fishes," I find a quotation from Yarrel concerning this habit of *Hippocampus.*

E. S.

Hen and Rat.—A hen strayed from the yard, and made herself a nest in the adjacent hedge; and, having laid eleven eggs, commenced to sit. On Friday morning a large rat was discovered close beside her, and quite dead. As no wound could be found on its body, such as a cat or dog would inflict, and as no poison is ever used by us, the only conclusion we can arrive at is that the rat was killed by the hen while endeavouring to steal her eggs.—*The Farmer.*

Correspondence.—*Miss E. Bradley.*—The 'scum' you mention is a *conferva.* Keep your globes less exposed to the light, as its presence is no doubt due to an *excess* of light. It is a troublesome pest both to marine and freshwater aquaria, but is generally harmless to the inhabitants.—*Ed.*

EXCHANGES.

(*The fee for insertion in this column is at the rate of* 1*d. per line*).

Communications for the Editor should be addressed Frank J. Rowbotham, 42, Loftus Road, Shepherd's Bush, London, W., and should reach him not later than the 15th of each month.

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Natural History Notes.

EDITED BY

FRANK J. ROWBOTHAM.

OCTOBER, 1881.

THE FORMATION OF SHINGLE BEACHES.

ONE of the most useful functions of NATURAL HISTORY NOTES is to provide a convenient outlet for that species of bewilderment which occasionally oppresses the student when he finds suddenly that some authority whom he respects lays down decidedly, and without a doubt, an explanation of some phenomenon which differs entirely from that which the student has hitherto believed as an article of faith, and when the new explanation is accompanied by reasons which to the student seem insufficient to warrant the apparently new law. Such a feeling of bewilderment may have come over some readers of *Nature* of the 28th of July last, on reading an editorial article entitled "Sea-shore Alluvion," in which it is laid down explicitly and at length, as a well-known and accepted fact, that, in the formation of shingle-beaches, tidal currents have no influence *whatever*, the whole of the effect being due to wind-waves; for such a theory, however old, is certainly in conflict with the belief of many young, yet intelligent, students of the subject; and *Nature* is an authority that every man of science respects. It has, however, been said, wittily, if unfairly, that the able editors of *Nature* occasionally forget that they are not its *authors*. We may, therefore, presume humbly, and for our own improvement, to criticise its assertions.

Nature has especially as the object of its animadversions the following statements made by the *Engineer*, in some articles on English beaches:—"A very strong *tidal current* sets up the Channel to the eastward, and sweeps with it the rolling shingle."

"Knowing what we do also of the effect of *sea currents*, it is in our opinion exceedingly questionable *if their carrying powers* can be

arrested by anything short of a check which shall produce almost dead water."

Against these statements, *Nature* asserts what is said to have been the accepted opinion for many years, in the following words:

". . . these shingle formations are in no way affected by the tide, which must exercise only a negative influence, the flood and ebb setting in contrary and opposite directions, equal in character and neutralising each other. Shingle moles are in effect resultant on the wind-waves alone."

There is no dispute about the facts, the examples chosen being the beaches of the English Channel, where the movement is notoriously to the eastward, or up Channel, and those of the Eastern Counties, where it is to the south. The theory which *Nature* holds as to the cause of these movements, is, that "an alternate renewal and withdrawal, due to change of wind, produces a resultant leeward motion due to the wind the particular coast is most exposed to."

On the other hand, some students, at least, believe that the movements on the two coasts cited are caused principally, if not entirely, by the prevailing currents, and that these are due chiefly to the influence of the tidal wave, in the particular direction impressed upon it by the configuration of the land,—with some reservation in favour of what may be the remnant of the impulse due to the Gulf Stream; which would, however, in the case of the English Channel, coincide with that of the tidal wave.

In the open ocean, we are aware that the tidal wave would produce no current; that each wave would leap up to endeavour to embrace the moon, but that it would sink down exhausted into its watery bed. But in confined situations, we are all aware that there is a current produced by the tides, which may sometimes be violent enough to produce a "bore." The tidal wave passes all round the globe, and does not retrace its steps. It has been said that the tidal wave which washes our shores impinges on our south-western coast, and is thereby divided into two waves, one of which sweeps up the Channel, while the other rushes through the narrow seas round the north of our island, to meet its severed other half off the mouth of the Thames. To the currents caused in this manner have the prevalent direction of the waters, and

hence of the movement of the shingle beaches, been attributed by many students. If *Nature* says this is erroneous, they will begin to feel convinced that it is so; and yet, perhaps, some of them will not see *how* it is so.

The facts observed in the English Channel will agree with either theory. The prevalent current is up Channel, the movement of all the beaches is to the eastward; and this is how it should be, whether caused by the prevalent south-west wind, by the tidal wave, or by the nearly-exhausted Gulf Stream influence. But on the coasts of Norfolk and Suffolk there is not this agreement. The movement of the beaches is undoubtedly to the south; the influence of the tidal current would be to the south; but the prevalent wind there, as elsewhere in England, is the south-west, which must act in opposition. Easterly winds are strong during a part of the year, but only for a month or two, and these are not always the times of the equinoctial gales. When there *is* a strong gale from the north-east, the effect on the coast is marked; but this would naturally be the case on either theory when these two influences were combined.

The only help which *Nature* offers in this case is, that the movement is "due to the particular trend of the coast, and the North Sea offing."

One would like to have a clearer explanation of how this acts, and why the movement should not be the other way, in accordance with the prevalent wind, and not in its teeth, even with the assistance of the "North Sea offing."

The whole question, of course, depends upon whether all the efforts of the tides are neutralised by the alternate ebb and flow. As *Nature* says this is so, we may believe, as "of faith," and yet we would fain *understand*. In connection with the argument, it may be remarked that in the Baltic, where there is no tide, there are also hardly any shingle beaches, and these do not notoriously shift. So rare are they, that the small one at Heiligendamm, near Rostock, is attributed to a beneficent miracle, and forms the kernel of many legends. But there are prevalent winds in the Baltic, and wind-waves, as in the North Sea.

On any theory, the phenomenon is a remarkable one. The attention of any one wishing to study the question may be directed to two striking examples, less known than the celebrated Chesil Bank. At Aldeburgh,

in Suffolk, the Alde, after approaching within a hundred yards of the sea, is turned to the south by a bank of shingle *eleven miles long*, which has undoubtedly been heaped up from the north, to the disadvantage of the town, which is thus eleven miles from the sea by water, though not one by land. On the south coast there is a perfect gem of an example, in a small way, at Axmouth, where the Axe, running down a valley at right angles to the coast, is abruptly turned almost at right angles to the east by a shingle bank. To take this course the river has been compelled to pare off a piece of the high Trias cliff, which it has not shrunk from doing. It is only with difficulty that the Axe keeps its mouth open, and it is doubtless still travelling eastward. S. J. W.

[Since the foregoing paper was sent to us, a letter has appeared in *Nature* for September 15, by Mr. G. H. Kinahan, of the Geological Survey, which accords with the view here advocated. After six years' careful observation on the south-east coast of Ireland, Mr. Kinahan found that "tidal currents were the principal motive power; and on again reading what had been written on the subject," he discovered that "nearly all the advocates for the driftage of sea-beaches by wind-waves had studied on beaches *where the most continuous and powerful winds acted in conjunction with the flow-tide current.*" Further on he says, "When there are only wind-waves and no tidal currents, the beaches are banked up, but do not travel; . . . but wherever there are tidal currents acting on a coast the beach must travel."—Ed.]

HINTS ON COMMENCING THE STUDY OF BOTANY.

By Professor Boulger, F.L.S., F.G.S.

(Continued from Page 86.)

Nothing worth having in this world—not even a knowledge of Botany—is to be got without painstaking; and perhaps not the least value of science in intellectual training is the habit of employing accurately and intelligently a carefully-constructed, special terminology of words with a precision of meaning rare in popular parlance. A term is moreover often a kind of shorthand, embodying many and complex ideas—and life is short.

Any one more than thirteen years of age could, I should think, if of only average ability, begin at once with Professor Oliver's *Lessons in Elementary Botany* (Macmillan, 4*s.* 6*d.*), which one can only speak of as a model of what such a book should be. The first eight chapters can be read through when neither Buttercup, Wallflower, Daffodil, or Arum is to be had; but the first three are all that need be read at this time, and the Lesser Celandine (*Ranunculus Ficaria*), which flowers chiefly in April, may be taken as a first type instead of the later Buttercup. Nor should the first year's student miss the season for observing the Primrose, Daffodil, and Arum, though the Hazel may be too early, and the Willow perhaps not easy enough for his small stock of experience.

It is undoubtedly simpler and more interesting for any one to begin with the flowering plants—the course adopted in the books already mentioned—owing to the larger size of the parts, though they are in structure the most complex of the vegetable kingdom. To do this, and thus become acquainted with the external structure of some forty plants, belonging to nearly thirty different orders, which are described in Professor Henslow's book, and in chapters four and five of Professor Oliver's, all the student requires in the way of apparatus is a sharp pen-knife and a pocket-lens Some bent needles (they will bend in a gas-flame), mounted in handles, such as lucifers tied round with thread, are often of use in dissection.

The beginner should certainly practise drawing what he sees, and in doing this will find Professor Henslow's *Floral Dissections* (Stanford, 4*s.*) a useful guide as to what he should look for, and its meaning. It contains partial dissections of nearly four hundred different plants, either wild or common in gardens. During the first year's study also, considerable facility should be acquired in writing out full descriptions of leaves, flowers, and whole plants. Miss Youmans gives some examples of leaf description, as also does Sir Joseph Hooker in his *Primer of Botany* (Macmillan, 1*s.*). Professor Henslow also gives examples of floral schedules, which are useful in determining the orders to which plants belong. They are, however, in my opinion, liable to two great abuses. First, the pupil is apt to look upon them as descriptions of a species, instead of, at most, brief generic diagnoses; and to get into a habit of superficial unobservance. Secondly, they are apt to be mis-

taken for characters true of a whole order, instead of those of single types, which may be exceptional in some particulars. Professor Oliver, in an appendix, gives some excellent models of full-plant descriptions. The student had better err on the side of too much detail, and should pay particular attention to the relative size of floral and fruit organs, as measured in descriptive floras. For the explanation of terms, some help may be derived from Dr. Lindley's *Descriptive Botany* (Bradbury & Evans, 1*s.*), which is illustrated, or from Mr. Bettany's more modern *First Lessons in Practical Bo.ary* (Macmillan, 1*s.*), which is not.

(To be continued.)

PLANT-SUPERSTITIONS.

(Concluded from Page 83.)

The Cowslip (*Primula veris*) is known in some parts of the country as the "paigle." The Anglo Saxon name is *cuylippe*, or *cuslippe*. Some old herbalists have compared the pendant flowers to a bunch of keys—the badge of the Apostle Peter,—and so derived the name Herb-Peter. This resemblance to a bunch of keys has earned for the plant in Germany the name *schlüsselblume*, or key-flower. The Bugle (*Ajuga reptans*) is contemporary with the cowslip; and, though quite as common in woods, copses, and fields throughout England, is not so well known. The generic name of the Bugle was first applied by Linnæus, from a belief that this, or some closely-allied species, was the one referred to by Pliny, and other classic writers, by a very similar name, meaning *to drive away*.

The Germander Speedwell (*Veronica chamædrys*) is another wild spring-flower. Some writers think the botanical name to be of Eastern origin, signifying *good remembrance*.

The White Lily (*Lilium candidum*) is a native of the Levant. It was dedicated by the Romish Church to the Virgin Mary, and is employed on July 2, in connection with the celebration of her visitation. The dedication of the lily to the Virgin has brought the plant into much more general cultivation. In Roman Catholic countries the White Lily growing in their gardens is a distinctive mark of the Romish adherents.

The Foxglove (*Digitalis purpurea*) has been called finger-flower

thimbles, fairy's dresses, and the mouths of tigers, lions, and dragons, from certain similarities which it may have been conceived to bear to these objects.

Borage (*Borago officinalis*) is known in Spain as *borraja;* in Italy, *borraggino;* in France, *bourrache;* in Germany, *borretsch.* The plant was believed to impart courage to those who had sufficient faith in its efficacy to administer it to themselves. This belief is transmitted to us in the old adage, "I, borage, give courage."

Roses are admittedly the emblems of love. An old tradition says that a rose gathered upon Midsummer Eve, and kept in a clean sheet of paper till Christmas Day, will be fresh enough for a maiden to wear in her bosom, when he who is to be her husband will come and take it out. In Thuringia the rose holds a similar position as a love charm. A maid who has several lovers will name a rose leaf after each, and then scatter them upon the water,—that which sinks the last representing the future husband.

The Egyptians, according to Nechessor, dedicated the Chamomile to the sun, because it cured agues. Petaphylon, besides healing wounds, and soothing a troubled spirit, bestowed the gift of eloquence upon him who carried it about his person.

The sacredness of the Mistletoe is said to have been a part of the ancient religious creed of the Persians, and to be not yet forgotten in India. It has been well remarked that the mystery of its appearance, its aerial place of growth, and its pale-green antlered branches, putting forth their pearly berries in honour, as it were, of the high festival of the winter solstice, probably conduced to render the mistletoe a miraculous plant.

The Nepenthes is highly celebrated by Homer, and by Diodorus Siculus it is regarded as a remedy for anger and sorrow. Nepenthes was probably some preparation of opium and dutroy, both the produce of Egypt.

The St. John's Wort was a Druidical plant, and is still connected with many superstitious customs observed in outlying districts on Midsummer Eve. These performances, like those of Hallowe'en in Scotland, are believed to reveal to the anxious enquirers the events of the coming year, and to enable them to prognosticate their lot for married or

single life. In Lower Saxony the young girls gather sprigs of St. John's Wort on the eve of St. John, and secretly suspend them on the walls of their chambers, with certain mystical ceremonies. The state of the plant on the following morning indicates their future fate. If fresh and undrooping, it foretells a prosperous marriage; if fading and dying, the reverse. The plant is influenced by the condition in which it is placed, and those who have damp walls are the more likely to have prosperous marriages than those whose walls are as dry as they should be.

On St. John's Eve, crosses are made of sprigs of the Mountain Ash, and hung upon the cattle, and placed over doors, and in the eaves of barns and houses, to avert the evil influences believed to be unusually active at that time.

Much remains to be said of the superstitions relating to plants. We trust that, in the brief space at our command, we have touched upon features of special interest; and, in conclusion, commend the study to all who desire to trace human thought and action through their varying stages of growth.

W. E. Bowers.

THE FORMATION OF A SUSPENDED CHRYSALIS.

The other day, I had the good fortune to witness the chrysalizing of some caterpillars of the Small Tortoise-shell Butterfly (*V. Urticæ*). The method of preventing the pupa dropping, when the larval skin has come off, is so interesting as to justify my describing the process at length.

When the caterpillar is full-fed, it spins a little tuft of silk on the side or top of its prison. To this it suspends itself by the claspers, head downwards, and assumes the form of a capital J. It is quite motionless for about twenty-four hours, during which time the second and third segments become yellow and green, and the posterior ones assume a dull reddish tint. At the end of this period, a series of undulatory movements commences from the tail to the head. This lasts for about five minutes, when the skin slowly splits down the back, showing the pale-green chrysalis within. The front part of the skin comes away more slowly.

These undulatory movements push the skin towards the tail. The lobes of the head (popularly known as "eyes"), which contain the

antennæ, etc., rolled up, are drawn off by the front part of the skin, to which they are attached. When this is accomplished, the skin remains round the tail end of the chrysalis; and, after great exertions on the part of the pupa, the tail comes out of the skin, showing it to be suspended to the latter by a ligament fixed to the twelfth segment. The skin, of course, is still attached to the tuft of silk. The animal then stretches up to the tuft, and touches it with its tail, which, after a little trouble, becomes firmly fixed. The tail, as has been mentioned in a former number, is covered with little hooks, which are entangled in the silk.

As soon as the tail is fixed, the pupa releases hold of the muscular band which before supported it. The skin, by dint of a little pushing from a chrysalis, comes off easily, and leaves the pupa hanging alone. Perhaps this supporting ligament is the muscle which controls the claspers, and therefore, when let go, the latter do not grasp the silk firmly.

When first formed, the colour of the wing-cases is pale green, and the abdominal segments are dull red. The legs, antennæ, etc., are separate from the rest of the body; and the whole is so soft that a fall of a few inches will completely deform it. This accident happened to one of my chrysalides: the head and wings were all on one side, and the legs twisted and bent out of place; but, strange to say, after a good deal of manipulation with a needle, it made a very fair chrysalis.

As soon as the embryonic-pupa has assumed this position, a fluid oozes from out its body, chiefly from between the tips of the antennæ, which fills up all the crevices, and, when hardened, forms the chrysalis-case. The chrysalis becomes coloured in about two days. E. H. H.

NOTES OF A RAMBLE OVER HINDHEAD, SURREY.

On our way from Haslemere to Hindhead we noted many interesting wayside plants in flower. On the grass beside the road the little *Euphrasia* was seen in abundance. The corolla here was white, varied with yellow; but we subsequently met with it on the top of Hindhead with the petals purplish in colour, with yellow markings. Here and

there the Foxglove was seen, but only a single specimen in bloom was gathered. *Knautia arvensis* still adorned the hedgerows with its pretty lilac blossoms, but they did not look so fresh as a month or two ago. Abundant everywhere was the common Ragwort (*Senecio Jacobæa*), covering every available spot with its corymbs of golden flowers. The Tormentil (*Tormentilla officinalis*) showed its bright yellow petals everywhere at the base of the hedgerows.

These, with other forms too numerous to mention, decorated the wayside for some distance from Haslemere, but, as we gradually ascended Hindhead, they died out, being almost totally supplanted by the heather (*Calluna*) and gorse; thus illustrating, in a common manner, the theory of the survival of the fittest, as we were made painfully aware of after a nearly fruitless search for plants on the hill-top. None but the stronger weeds, such as some of the Compositæ (*Thrincia, &c.*) can successfully compete with such foes as heather or gorse. The gorse here observed is the Dwarf Furge (*Ulex nanus*), distinguished from its predecessor in the year by being smaller in all its parts. Associated in equal quantity with the gorse and heather, was the wax-like flowered *Erica tetralix* (Cross-leaved Heath).

Space will not permit me to dilate on the magnificent scenery which presents itself during the ascent to Hindhead, which an artist-friend compared with that of Dartmoor,—nor on the grand views to be gained from the hill-top, 995 feet above sea level at the highest point.

A ramble on the hill-side revealed a few plants, but these were chiefly met with in open spaces, tolerably free from heather. A large agaric was seen, specimens of which in a state of decay presented an extremely loathsome appearance.

As one descends from the hill-top into the valley, a gradual change in the flora is observed. Slowly the heather, which, higher up, had usurped the place of its weaker competitors, gives way to meadow-land and hedges, with our old friend the bramble, and many of the flowers we met with on our way from Haslemere. This distinction between the botany of the hill-top and that of the valley is very instructive as illustrating a chapter in the distribution of plant-life.

But what attracted my attention most of all, by their abundance and variety, was the grasshoppers. On a sunny path on the hill-side I spent

some time watching and capturing these insects. Many, I noticed, were much less active than others,—allowing themselves to be pounced upon with but little effort to escape. The reason for this was soon found, when I observed several at rest *minus* one of their hoppers.

On this single path, in the course of an hour's search, I captured twenty-two specimens, eighteen of which appeared to me to be different both in colour and form from each other; but of this I am uncertain, as, unfortunately, not having any poison at hand, I killed them with boiling water, which I now find has destroyed most of the colours (in some cases extremely brilliant), by which I had hoped to distinguish them. I must therefore defer, to a future number, a list of the species, which I had intended should have accompanied this note.

On a sunny bank at Haslemere, I subsequently captured nine specimens, all of which appear to be different.

NOTES AND QUERIES.

Instinct in a Caterpillar.—The other day I noticed a singular display of intelligence in a caterpillar. It wanted to climb out of a glass jar in which it was confined, the sides of which, however, were wet, and did not afford it foothold. It waited quite still for about a minute, thinking, I suppose, what it had better do. Then it began to wave its head slowly from side to side in a very incoherent manner. But on looking closer, I found that it was spinning a zigzag, wavy line on the glass, which it used as a ladder; and so got up, spinning as it went, till it reached the top, when it was promptly put back. I noticed that the pro-legs were fringed by little brown bristles, scarcely visible to the naked eye. These caught and held on to the thread which it spun.

E. H H.

Plant Superstitions.—A farmer from Lincolnshire told a friend of mine that in the part of the country from which he came, the red stain-like blotches on the leaves of the Persicaria (*Polyganum Persicaria*), were supposed to have originated from the blood of Christ, who, having cut His finger, wrapped one of the leaves around it, and so left a small blotch on both sides the midrib of the leaf.

A Musical Cat.—Our little girl had a cat which was *very* fond of music, always assisting (as audience only) at the practisings, sacred or profane. One Sunday, after playing some hymns to the children, the piano was left open, whilst the family retired to prepare for Church. During their absence a "strumming" was heard on the piano, which was kept up for some time. At length, thinking it to be her little boy, Mrs. Turnbull went into the room to take him away, when, to her surprise, she beheld the cat standing upon its hind legs on the music stool *strumming on the piano!* This is a *fact.*

Miss Turnbull, *Edinburgh.*

Variety of Anthrocera Filipendulæ.—The other day I caught a variety of this moth, in which the red spots of the fore-wings are replaced by orange. The hind-wings are of the normal colour, except a small orange patch on the hind margin near the anal angle.

Can any one tell me why *A filipendulæ* generally hatches in pairs (a male and female)? I noticed this with about twenty chrysalides which I had. E. H. H.

Trunks of Trees.—Recent botanical research has shown that the trunks of trees undergo daily changes in diameter. From early morning to early afternoon there is a regular diminution till the minimum is reached, when the process is recovered, and the maximum diameter is attained at the time of twilight; then again comes a diminution, to be succeeded by an increase about dawn,—an increase more marked than that in the evening. Variations in diameter are believed to coincide with the variations of tension, but they are shown to be inverse to the temperature,—the maximum of the one corresponding roughly to the minimum of the other, and so on.—*Public Opinion.*

EXCHANGES.

(*The fee for insertion in this column is at the rate of* 1*d. per line*).

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Natural History Notes.

EDITED BY

FRANK J. ROWBOTHAM.

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WEYMOUTH; AND A LITTLE EXPERIMENT.

No one who is not a naturalist or philosopher should ever go to any place, in England especially, boasting a bay like the bay of Naples. No mere health-seekers should go to such; no people sensitive to bad odours and relaxing climates. But I hold that naturalists, or enthusiastic students of chemistry, physiology, botany, and geology,—philosophers in general, are not sensitive to sights, sounds, and odours that would be deadly to other people.

I have known one man rise from his breakfast and gloat over some awful chemical experiment, the fumes of which chased every one from the room, and which must have mingled more or less with the very food he was eating as he bent over the crucible.

I have known another, a microscopist, get up in the middle of his dinner to see how the diatoms, simmering in dilute nitric acid, were getting on, and if the guano were sufficiently consumed so as to leave the diatoms clean and clear; and I have seen the old man dip his finger into the hot liquid and thoughtfully taste his cookery, and return to his dinner!

Imitation bays of Naples resemble that beautiful bay only in form, and have, as a rule, all its faults and unpleasantness without its wondrous colouring, the translucent atmosphere, limpid blue sky, and the delightfully madcap inhabitants of Naples.

But let naturalists, by all means, go to that and any other bay like it. Weymouth is an excellent example. It has, of course, a harbour where the rarest combinations of odours can be studied, and where living, dead, and decaying animal and vegetable life can occupy the anatomist,

physiologist, and microscopist. The physiologist can study the evolution of oaths, and the changes the English language can undergo in the mouths of the British and foreign tar, the "British Workman" and rough, who can change, for instance, the catholic and not unpleasing ejaculatory oath of "by our Lady," into the offensive oath, and now indispensable adjective, and sometimes adverb, *bloody*, with which the *rough* delights in offending our ears. Invalids and health-seekers go to Weymouth and walk along the beach, or near it, and, as there is always a thick and long ridge of decaying seaweed, principally and conspicuously the *Ulva-lactuca*, and others of its kindred,—the enraptured promenaders inhale the saline, putrid odours and say: "Oh, what a delightful smell of the sea!" thus maligning the fresh, pure, and scentless ocean.

But what wonders can a naturalist find in the ridge of ulva! Rare seaweeds, corallines, and zoophytes; and it is alive with myriads of Entomostraca of every conceivable kind, and in every stage of strange development. There is endless pleasure to be found there. One wants only one or two large clear glass bottles, a few retired pickle-bottles and tumblers, and a pocket compound-lens, and the days and hours fly away uncounted, unheeded, "the world forgetting, by the world forgot," as we fill, with clear sea water, our bottles, and place sea-weed, or "curiosity," or queer organism in them, and examine at leisure and take home selected specimens for more careful study.

There is, close to Weymouth, a bright, white, rocky island, where both health-seekers and naturalists would find delight and pleasure, were it not for that "blot upon the island" of the Portland convict settlement.

Portland stone, of course, is quarried there. The island is about three miles in length, and a mile in width. It rests on the Kimmeridge Clay, above which is a belt that fringes the south, east, and west coasts, and spreads out towards the north side, or that which is nearest to Weymouth; while the highest strata are those of the upper, middle, and lower Purbeck beds. The Portland sands form a belt on the north side, and join the Chesil beach, of which more anon.

As the same geological strata are to be found at Weymouth, excepting the Portland series, I shall reserve mention of their fossils till I touch on the geology of the mainland.

The Kimmeridge Clay is dark blue, or slaty, in colour. Some of it is

highly bituminous. Its characteristic fossils are Ammonites, Terebra Portlandica, Perna, Trigonia, &c.

The Portland Oolite is really a shelly limestone, except the uppermost bed, which is hard and compact, and very valuable as a building-stone.

The Purbeck beds are principally freshwater deposits, and abound in shells and other fossils.

Portland is an interesting little island, with ancient and still existing laws and social institutions and customs of its own, of which I shall not write here.

On the rocky coast of Portland, and where there are sands, there are two good things to be got; good bathing and swimming, and excellent work for the Editor of, and Contributor to, NATURAL HISTORY NOTES.

From the island, along the south mainland coast extends a beach or bank. But a bank! *Such* a bank! *There* is a "deposit and reserve" for you! On my first visit to it there was rifle-shooting going on. I take an interest in War, as a philosopher, and study its necessity, its evolution, its position, so to speak, in civilization. But I am also a naturalist, and was, with my father and sisters, studying, as we walked along, the natural history of the Chesil Bank, when a rifle ball struck the ground close to me, and not a yard from my old father.

"Oh! that it had struck my hat," I exclaimed," that I might have complained to the War Office, the Admiralty, or any other fabulous animal. Of course, I should have felt afraid; but if I only could complain, only be a woman with a wrong!"

"Darned if it wouldn't have been the first time she felt fear," said a tanned old boatman who had often rowed us out, myself sometimes alone, along that Weymouth coast.

That praise from a Jack Tar has demoralized me, and once nearly cost me my life in Turkey.

"Of that more anon," on tidal and river currents.

But to the Chesil Bank. It has a gradual slope from the island and mainland. When you reach the top of the bank you feel surprise and a gruesome awe as you look down on the other side, steep and awful; for you know, if you are a swimmer, you might be flung a thousand times on that bank of stones, all cruelly round and slippery, and a thousand times would the smallest wave, let alone a great storm or tidal

wave, suck you back, playing with you as a cat plays with a mouse, without giving you the merciful and benumbing shake the carnivoræ give to their victims.

The curious thing with respect to the Chesil Bank is this—and I tested it more than once:

Close to Portland the stones are of large size. Certainly more than four inches in diameter, and only one and a half to two inches in thickness. They are of the size and shape of old-fashioned Buckinghamshire suet dumplings, or *swimmer-cakes*.

Take, at the very commencement of the bank, the largest stone you can find, and walk onwards for about three yards; then get the nearest in shape and size to your pattern which you can find. Leave No. 1 in some easily-recognized hiding place, or with a friend, and continue your walk along the beach, which is several miles in length, to past Cliff-end. Drop, as you go along, the subsequent pattern-pebbles, keeping only the one which seems to be the nearest to your last model.

Each one you find is almost imperceptibly smaller than the preceding one, till at length you find them diminishing to mere grains of sand, and that without your perceiving that there had been any material difference between the one you held, compared and threw away, and the tiny grain. Returning to where the first had been left, it seems incredible that your pattern had been so huge and the latest pebble so minute.

There is one peculiarity I remarked about Weymouth Bay, which, however, is not entirely peculiar to it. The tide returns, bringing back, with morbid honesty, all that had been consigned to it that would float. I have heard of a similar conscientiousness of the sea on one part of the Isle of Wight.

A lady and gentleman had some hard-boiled eggs, which were still hot when they sat down on the beach to partake of their pic-nic lunch. To cool them, they placed them in a little scooped-out hollow in the sand, to which the wavelets had gradual access.

Presently the young couple saw that the tide had risen, and that one egg was being floated out to sea beyond their reach. Six hours later, resting again at their favourite spot, the wife exclaimed: "I do believe that little white spot is our floating egg;" and so it was; and it was

brought and deposited as *jetsam* close to the spot where it had started as *flotsam* in the morning. And so at Weymouth. The first day of my arrival I saw a dead eagle, with its legs tied together with a piece of red printed calico, thrown on the beach and served up, so to speak, on a bed of green ulva. For the whole six weeks or two months we were there, we were haunted, like Eugene Aram, with this dead thing. On the beach, or bobbing close to us as we were swimming, that creature turned up. The last swim I had, on the day we left, my foot struck against "the horrid thing," and warned me never to commit murder there, so I never did. S. M.

(To be continued.)

REPRODUCTION OF THE GALL-FLIES.

INSECT-LIFE furnishes no more curious facts than the reproduction of the Gall-flies (*Cynipidæ*). Not long ago it was believed that in the common gall-fly (*Cynips Kollari*), the male sex was not represented, and in many other species the males were exceedingly rare. It is to M. Adler, of Schleswig, that we are indebted for an explanation of the anomaly, as well as for the discovery—at least, among insects—of a new form of alternating generation. In one generation, developed in the spring, we have an insect so unlike its parent as to have been classed in a different genus, while this, in its turn, produces from a different kind of gall, in the following spring, the original form. In some cases the one form includes males and females, the other females only. We can here only notice one of the more remarkable. *Biorhiza aptera*, a little wingless insect, not unlike the common flea, but with rather long antennæ, is produced from galls on the roots of the oak; to lay its eggs, it crawls to the young shoots above, especially the terminal buds; on these galls are formed, from which, in due time, there emerges males and females—the former only winged—known under the name of *Teras terminalis*. Another Biorhiza gives origin to winged females as well as males, which have been referred to another genus (*Trigonaspis*). According to M. Adler, it is not the egg which, in the Cynipidæ, causes the gall, it is only when the larva is hatched that the gall begins to form.

HINTS ON COMMENCING THE STUDY OF BOTANY.

By Professor Boulger, F.L.S., F.G.S.

(Continued from Page 94.)

During the summer vacation of his first year, the student, having done his best to master the first seven chapters in his *Oliver*, should procure a Flora and begin to form a herbarium. If he is content to find out by his own unaided efforts all but the mere name of the plant, Mr. Hayward's *Botanist's Pocket-Book* (Bell, 4*s.* 6*d.*) will suit him; whilst if he wishes to learn rather more, with but little trouble on his own part, Mr. Bentham's *Handbook of the British Flora* (Reeve, 12*s.*) may be used. More thorough works, however, though undoubtedly more difficult to use, are Sir Joseph Hooker's *Student's Flora* (Macmillan, 10*s.* 6*d.*), and Professor Babington's *Manual of British Botany* (Van Voorst, 10*s.* 6*d.*, or on thin paper, in limp cover, for pocket, 12*s.*). Of these, the former is marvellous for its terse precision in the characters, and for much condensed information on geographical and altitudinal distribution and on probable affinities; whilst the latter, now in its eighth edition, is unrivalled for the minute discrimination of the difficult "critical" groups, such as aquatic Ranunculi, roses and brambles, and for its accurate synonymy.

In forming a herbarium, the chief requisites are a vasculum, a press, drying-paper, and cartridge paper for mounting. The first is usually a big japanned "sandwich-box," which should not be less than fourteen inches in length, and can be obtained at Gardner's in Oxford Street, or of other dealers, for about five shillings. For a press, two drawing-boards with two straps round them will serve admirably; but additional pressure being often advisable, the kitchen-weights, or the leg of a four-post bedstead, can be put in requisition. The best drying-paper is that sold by Messrs. West, Newman & Co., 16 inches by 10 when folded, which is thirteen pence per quire, or fifteen shillings per ream. Less than a quire can be of little use, as, especially in the case of succulent and water plants, strong pressure and daily change from damp to dry paper are advisable. In this way any plant ought to be dried to brittleness in a week; but the order Crassulaceæ (Stonecrops, &c.) require to be killed by boiling water before being pressed. Every specimen should

have a ticket twisted round the stalk when put to press with its name, locality and date of gathering or the name of the donor. This rule will prevent many serious errors. It is best to mount the specimens on folio-size cartridge paper, so that they may be tolerably uniform with those of other collectors, which may be received in exchange. A good specimen, intended to be kept permanently in the herbarium, is best fastened to the paper by lightly washing the whole of one surface with weak glue ; but duplicates, or less important specimens, can be strapped down by three or four narrow strips of gummed paper. For this purpose it saves time and trouble to buy and cut up labels sold ready-gummed. Care should be taken to avoid, if possible, mounting more than one species on a single sheet ; and if there are more than one specimen having distinct histories as to date or locality, they should be marked *a*, *b*, *etc.*, and correspondingly described at the right-hand bottom corner of the sheet. Here should be written plainly the full name of the plant in Latin, the locality, date and name, or, at least, initials of gatherer. Varieties, sports, or exceptionally large or small forms, are always of interest, and should certainly be collected ; and it adds to the value of a herbarium for private study to affix a drawing either original or otherwise, dissections, or newspaper or other cuttings, elucidatory of the specimen, or references to published notes or descriptions, to the sheet. The custom of fastening specimens in books is a mistake, as it prevents re-arrangement, or the addition in their proper places of new acquisitions. Should the student in the course of his collecting come across a single specimen of a rarity, it will probably do him more good to dissect it than merely to dry it as a "ktema es aei ;" but the difficulty can generally be met by the dissection of a single flower.

I hope that to any real student-lover of Nature the merest caution is needful as to respecting real rarities, recognising the claims of other collectors, and avoiding all risk of diminishing the tale of the British or other Flora.

In this manner the student who began the study of botany at Christmas, ought by the end of September to have become tolerably familiar with the first eight chapters of *Oliver*, and to have studied types of at least the fourteen natural orders of flowering plants mentioned in the syllabus of the Preliminary Scientific Examination of

the London University. These are the Ranunculaceæ, Cruciferæ, Caryophylleæ, Leguminosæ, Rosaceæ, Umbelliferæ, Compositæ, Scrophulariceæ, Labiatæ, Amentaceæ, Orchideæ, Liliaceæ, Cyperaceæ and Gramineæ. Before proceeding further, I would say that in examinations I have not seldom found second year's students who have not really mastered this much. There is a great deal of wisdom in the old advice to be a "man of one book," at least until it is thoroughly assimilated; but I cannot help recommending the perusal, during the autumn or winter, of the second or physiological division of *How Crops Grow*, by Professors Church and Dyer (Macmillan)—a most valuable work, now unfortunately out of print, the appreciation of the first division of which requires a considerable study of chemistry. This will widen the beginner's conception of the plant as a living organism; and in the same way to read some account of the geographical distribution of plants will give one a better idea of the Vegetable Kingdom as a whole, but this can perhaps be postponed for the present. Certainly, the student cannot hope in his first year's work to digest what Professor Oliver has to say of nearly eighty natural orders; but having studied the fourteen above-mentioned, he may so far anticipate matters as to read the few pages at the end of the volume devoted to the Flowerless or Cryptogamic Plants. These are treated, together with the Flowering Plants, in *How Crops Grow*, and in most modern elementary examinations some knowledge of them is expected. Here, however, at the close of my description of the first year's work, I must introduce some general comments.

(To be continued.)

THE HABITS OF EARTH-WORMS.

By means of his recently published work on the subject of earth-worms, Mr. Darwin has opened the way to a wide field of enquiry and observation amongst earnest students. The least pretentious amongst us may by patient and faithful observation, whether carried on in the field, or in his patch of London Clay, designated by the name of "garden," add considerably to the stock of information we already possess concerning the habits of these creatures. There are many of such habits recorded by Mr. Darwin, which it would be very interesting

to verify, and, possibly, add to, by self-observation. Notable amongst these is the drawing-in of leaves, and other objects, both for food and for plugging up the mouths of their burrows. With reference to this habit, Mr. Darwin says, "When worms cannot obtain leaves, petioles, sticks, etc., with which to plug up the mouths of their burrows, they often protect them by little heaps of stones; and such heaps of smooth rounded pebbles may frequently be seen on gravel-walks. Here there can be no question about food." This habit was verified by a lady, who removed the stones from several of such heaps; and then by watching the worms at night with the light of a lantern, was enabled to see the worms replace the stones "by the aid of their mouths, no doubt by suction." The number of stones contained in each heap was increased each evening. "One stone which had been dragged over the gravel-walk to the mouth of a burrow weighed two ounces; and this proves how strong worms are."

Mr. Darwin imagines the object of this plugging to be that of "checking the free ingress of the lowest stratum of air when chilled by radiation at night."

Experiments were made by Mr. Darwin with various leaves, in order to ascertain *how* these were dragged into the burrows, *i.e.* whether by their tips or bases or middle parts. With regard to leaves of plants not natives of our country, observation was especially directed, for, as Mr. Darwin tells us, "although the habit of dragging leaves into their burrows is undoubtedly instinctive with worms, yet instinct could not tell them how to act in the case of leaves about which their progenitors knew nothing. If, moreover, worms acted solely through instinct or an unvarying inherited impulse, they would draw all kinds of leaves into their burrows in the same manner. If they have no such definite instinct, we might expect that chance would determine whether the tip, base, or middle was seized. If both these alternatives are excluded, intelligence alone is left; unless the worm in each case first tries many different methods, and follows that alone which proves possible or the most easy; but to act in this manner and to try different methods makes a near approach to intelligence."

It becomes, therefore, extremely interesting to learn the results of these experiments. The leaves used were of various shapes, and both of

endemic and exotic species. In by far the majority of cases the part of the leaf seized by the worm was that which would offer least resistance to being drawn into the burrow, *i.e.* the apex. "Nevertheless worms break through their habit of avoiding the footstalk, if this part offers them the most convenient means for drawing leaves into their burrows."

The results of experiments made with elongated triangles of paper were that "nearly three times as many were drawn in by the apex as by the base."

As to whether such action may be defined as intelligent or non-intelligent, Mr. Darwin says: "we can safely infer intelligence only when we see an individual profiting by its own individual experience"; and he adds that "if worms are able to judge, either before or after having drawn an object close to the mouths of their burrows, how best to drag it in, they must acquire some notion of its general shape," and thus influence their actions by the result of individual experience.

Now, here is work for our readers; let us recommend them to try experiments with leaves or pieces of paper of various shapes, and by the results (which we will gladly publish) help to determine whether the much-abused earth-worm is possessed of that intelligence in being able to judge what is best for itself, which is so readily denied it by the ignorant.

NOTES AND QUERIES.

PLANT-SUPERSTITIONS.—With reference to the legend concerning the *Polygonum Persicaria*, contained in our last number, "E. S." writes: "The Persicaria is called 'Passions,' and I have heard it said that it grew at the foot of the Cross, and so obtained its blood-marks; perhaps this may account for the page and a half of medicinal virtues attributed to it in Culpeper's Herbal. Other names of it are Bistort, Snakeweed, English Serpentary, Dragon-wort, and Osterick."

GREEN ROSE.—In the summer I had to visit a Nursery Gardener's to enquire about some plants I wanted. I was walking through his rose garden with him; when he showed me a tree with green roses upon it. The flower instead of having petals, stamens, &c., like an ordinary rose had a quantity of small green leaves in the place of petals, inserted in

the ovary (which it is needless to say was barren). It was hard to distinguish the calyx from the corolla. But the peculiarity of the petals was that they were fragrant-smelling, like sweet briar. The whole plant, of course, was destitute of any organs of fructification, as the petals were merely leaves. The ovary was very curious; it looked like that of the common rose. To produce a green rose the plant is supplied when young with an excess of water. A.E.F.F.H.

[The above is a common instance of sport in the rose, by which the floral organs are transformed into green leaves, thus denoting their origin. Such changes are common to a variety of plants, when the conditions under which they ordinarily exist are changed.—ED.]

PLANE-TREE BUDS.—The dilated base of the petiole in the leaf of Plane-tree (*Platanus Occidentalis*), forms a cap to the bud, owing to the complete unison of the edges over the bud. On removing this cap, a second cap or sheathing scale is seen, of a green colour, which forms, as it were, the great-coat of the bud: for if this be stripped off in turn, a "court-suit" of rich light-brown velvet is met with; the latter being a development of silky hairs, which, together with the outer scale and petiolar cap, form an admirable protection to the delicate young leaves within.

"FRIENDSHIP ON ALL FOURS."—Under this title, "H.L.R." sends us an interesting and amusing account, which we regret is too long to allow us to publish at length, of a close intimacy existing between a skye-terrier and a cat. This friendship was specially manifested by the dog towards the cat on the occasion of the removal of the family from the country to Edinburgh; when the dog, having been the first of the two pets to arrive at the new home, and having inspected every nook and cranny thereof, evidently to his perfect satisfaction, received the cat upon *her* arrival with a hearty welcome, though, our correspondent tells us, "they embraced in silence." The dog then conducted his playmate "into every room in the house," looking over each "carefully and quietly," the former "appearing to wait with anxiety the cat's decision as to whether she could make this her home, or must return to the manor. Evidently the cat sacrificed her mere local attachment to the higher claims of friendship. They descended to the kitchen, happiness in every step, joy in every twirl of their tails." Our correspondent

queries whether the cat would have remained, "without such affectionate introduction to the advantages of her new home?" We shall be glad to receive any further anecdotes illustrating the friendship that, happily, so often exists amongst what we are pleased to term the *lower* animals, which we shall have pleasure in inserting under the above heading.

CURIOUS BIRDS.—While staying at Llangollen this autumn, I noticed among the sparrows which used to come and peck about the lawn attached to the house, what at first I took to be a white sparrow,—probably gone grey,—but, on watching more closely, found to be a kind of half-cast between a sparrow and canary; it was, however, entirely white.

On asking our landlady whether she had noticed it before, she said she had seen it all the summer; and also told me that during last winter a blackbird used often to appear, among other birds, with a white head. Have others of this kind ever been noticed? G. S. B.

ICHNEUMON AND CATERPILLAR.—I was called to see an ichneumon fly with a bright green caterpillar in its grip, with which it whirled round in a circle near its hole. We all watched it intently, and said: "Extraordinary stupidity, not to be able to find its own hole." We were then called away for a few moments, and I, thinking of Sir John Lubbock's fidelity in observing, told one of the boys to watch it in our absence. He shouted directly afterwards: "It is popping into the hole," and we turned to see the poor caterpillar tumbled in with it. The general opinion *then* was: "Clever creature, to have tried so long to deceive us, and to have disappeared into your hole with your treasure the moment our backs were turned."

RECEIVED TOO LATE FOR INSERTION.—*G. W. Bradshaw.*

EXCHANGES.

(*The fee for insertion in this column is at the rate of* 1*d. per line*).

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Natural History Notes.

EDITED BY

FRANK J. ROWBOTHAM.

DECEMBER, 1881.

WEYMOUTH; AND A LITTLE EXPERIMENT.

(CONCLUDED FROM PAGE 105.)

THE return-tide at Weymouth being of that nature, in consequence of the curve the bay takes, the set of the prevailing winds, &c., that floating decaying matter is not always carried out to sea, may make that place unwholesome for certain invalids; particularly so for anyone fanciful, or idle.

The study of relaxed sore throats can be profitably studied there—by the faculty.

But the pedestrian, or the enthusiastic naturalist, will be indifferent to such things as regards his health. It is "bad form" in a philosopher to be fussy and whimsical; to be always feeling his pulse and looking at his tongue.

A place like Weymouth is a paradise for him. As botanist, entomologist, geologist, &c., there is endless holiday and delightful occupation. You have only to look at the Ordnance-Survey Map of that part of our coast, the map that is coloured geologically, to see what a variety of land can be explored by the geologist, and, in consequence, the variety of its botanical and entomological treasures.

It is true that the terms Calcareous Grit, Coral Rag, Oxford Clay, Kimmeridge Clay, suggest dusty, gritty, white blinding roads and weary feet; also intermittent tempers and a heavy boot bill; sparsely growing grass, not what is called wild and varied scenery; rocks; cliffs; but not mountain and valley, nor much richly wooded country. But a good vasculum on one's shoulders, food enough to keep life in one for a day, a congenial chum, and the hammer of the God Thor to break the rocks with, and there is endless joy for those who have internal and external eyes to see.

The geological strata are of those which are, for convenience, and not always with scientific accuracy, termed the Middle and Upper Oolite. The fossils are mostly of marine origin.

A walk along the cliffs, or a boat to a few not distant points on the beach, may reward one with *Gryphæa dilatata*, septaria, &c.; and, indeed, within a five-mile radius from the town of Weymouth, a great variety of geological strata is brought under one's notice. Upper Greensand to the N.E., and the Hastings Sand, Weald Clays, &c.; the Purbeck Beds, the Portland Stone and Portland Sand, the Kimmeridge Clay, and Coral Rag, as you come westwards, then the Calcareous Grits, the Oxford Clay Series as you come S.W., and approach Melcomb Regis and Weymouth (Weymouth itself being on the coral rag), till you approach Portland on the south, where there appears the Kimmeridge Clay;—which, with the *debris* of all the above-named strata, forms the sands and stones of the coast and of the Chesil beach, and which reappears fringing the N., N.E., and N.W. side of Portland island.

It is simply impossible to do more in a few pages of this journal than to indicate "which way to go" to the geologist. A scanty list of the fossil corals, mollusca, &c., would be too long a list to give,—and is easily obtained in Bartlett's and other tabulated maps.*

The insect hunter can never weary at Weymouth, even on the parade; for on the very sea-walls, pavement, and railings, are glistening flies and shining beetles; here and there goggle-eyed, long-legged, bright-winged, wanderers per force or per fortune from all quarters of the globe.

On one very hot, sultry day I tried *a little Experiment*. It was a day to tempt one to mischief or busy idleness while waiting for a cool breeze;—a day on which one sought for amusement without bodily fatigue.

I took a large bell glass and resolved to collect under it as many insects as I could lazily and easily get from the hot side of the house-wall, the balcony, the pavement of the little backyard, &c., so as to see how these insects would behave if placed in "circumstances they could not control."

* There is also an admirable little Handbook to the geology of Weymouth and the Island of Portland, with maps and illustrations, by Robert Damon; Stanford, Charing Cross, 1860.

Could there be an insect *happy family?* Would they show any reason, or would they have only their puzzled instincts?

I obtained numbers of flies of many species. The Crane-fly, or Daddy long-legs flew to the top of the bell-glass and insanely bobbed up and down, scarcely ever descending to find escape. His legs stretched out straight behind him balanced him. Yet, had anyone touched those *necessary* and balancing appendages, he would have parted with them without a moment's hesitation;—would have left them quivering behind him—anywhere, with the customary levity of insects. Nature does not always provide for emergencies.

At once I saw the justice of the term *waspish* being applied to annoying people who will leave no one at peace. The wasps I had to take away at once; for they attacked nearly every other insect, besides having little duelling rounds with each other.

The beetles, as a rule, stood still and meditated on their underground experiences and shady lives, or they shunted themselves like insect-locomotives into sidings and drew little attention to themselves.

The house-flies at the least disturbance, touch of the bell-glass, &c., flew straight up as they so conveniently do for the purpose of facilitating our catching them, or they persistently walked round and round the lower part of the glass to find an exit.

The spiders, meeting flies, gave at once a start backwards, in a way curiously suggesting surprise and a little *fear*. They seemed to ask where *did* you come from? Your conduct is irregular, unparliamentary, illegal! Whereas the flies did not condescend to stop in their walk—and manifested no fear or any emotion whatever. I indeed several times saw flies thus encountered walk deliberately over the heads and round the back or abdomen of the spider.

The spiders continually attacked each other. The little male spiders were in great fear of their fat ladies, who have the interesting, practical, and economical custom of killing and eating those of their husbands and adorers to whom they may take objection.

There is much to be learnt from Nature!

After watching my happy family for some time I suddenly thought I would try an experiment with spirit, or alcohol, on the group. Too azy to look for pure spirit, I merely saturated a piece of cotton wool in

eau-de-Cologne; for I wanted to see if "Drunk as a fly" were a slander on flies, or if other insects might not deserve the same opprobrious epithet.

I shall never forget my amazement at seeing at once, every insect—spiders, flies, ants, bees, and beetles—hurry to the spot whence the perfumes of the eau-de-Cologne were rising, and each and all greedily sip at the spirit.

I was still more astonished at the different effect on each insect, and the different time that it took for the spirit to stupify or kill.

The spiders big and little made an instantaneous rush at the piece of cotton wool and died instantaneously, turning on their backs and drawing up their legs.

The Daddy long-legs came down from the top of the bell-glass, drank, re-ascended, and danced "the perfect cure" frantically up and down, and then died. The beetles waddled up, sipped, and died standing; and, of course all the flies, especially the house-flies, drank persistently, then staggered a little, and died after some time.

None of the insects would leave the spirit even when the glass was removed.

The "survival of the fittest" was shown in the case of the honey-bee. It could not fly away, but remained the rest of the day and the night motionless, rather swelled out and transparent with the liquid; and when I asked it in the morning "how doth that little busy bee?" and touched it, it flew off and unconcernedly went to business.

Pure spirit would not have been so attractive or so fatal. I am sure it was the essential oils that killed the creatures. The bee, accustomed to all sorts of honey, and "richest juice from poison-flowers," of course survived.

But be that as it may, almost all insects have a great fondness for alcohol, and beer of every kind is constantly put into bottles or traps to attract them to destruction.

In trying experiments with fleas, it is found that a flea will or may recover after having been dipped in spirits of wine, but never when even touched with any spirit containing essential oils or perfume.

So much for my little experiment at Weymouth.

S.M.

HINTS ON COMMENCING THE STUDY OF BOTANY.

By Professor Boulger, F.L.S., F.G.S.

(Continued from Page 108.)

The method I have sketched is, in my opinion, the most natural, most attractive, simplest and, therefore, best approach to Botany, especially for pupils under sixteen, or for those who do not intend to pursue the subject far. Another method is, however, prevalent on the Continent, and is coming into fashion here, which commences with the cell as the unit of all plant-structure, proceeds synthetically to tissues, members, and organs, and in "Special Morphology" begins with the simple but microscopic Protophyta, and then takes the other Cryptogams in an ascending series, leaving the Flowering Plants to the last. This system must be accompanied by copious microscopic demonstrations, and properly by actual work at microscopic manipulation on the part of the pupil; it is seldom interesting, and in my opinion is at most only suitable for those over fifteen. To such a course, however, chapter viii. in *Oliver*, and the few concluding pages, together with *How Crops Grow*, will form a useful introduction. Elementary examinations now-a-days often deal with Biology in general, instead of with Botany only, and require a knowledge of the "structure, functions, and life-history" of such plants as Protococcus and Yeast (*Saccharomyces*), Mould (*Mucor* or *Penicillium*), *Chara* or *Nitella*, and Ferns. On this point I would say, however, first, that I think that the high-pressure system of preparation for examinations is now carried to excess; secondly, that there is a great danger to teachers and to students of looking upon examinations as an end and aim of knowledge in themselves, instead of a mere test; and thirdly, that it is absurd for a first-year's student to bother anyone but his teacher with attempted papers, or to enter any government or other open competition. Before passing on, however, to discuss a second year's work at Botany, I may as well discuss the question—to whom shall Botany be taught.

It has been well said that children under seven ought not to have any systematic instruction imposed upon them. At that age, however, and even at a year earlier, the observing faculties are keen, and there is an inquisitive spirit and a lively imagination eager for "stories," which a

sensible teacher may turn to good account without undue forcing or "cram." I know few books more suggestive of what may be done at this stage than Mrs. Gatty's *Parables from Nature*, a work always popular with the little folks. Sanitary reasons recommend that growing children up to the age of twelve or fourteen at least should be brought up as much as possible in country air; and, in order that they may delight in that fresh air, and not develop prematurely into book-worms, it is well to cultivate their eyes and ears. Let them at least know each roadside weed by name, and be able to recognise every woodland note Botany has, even as a schoolroom subject, for pupils between seven and fourteen, especially for girls, advantages over the more exact or more "messy" sciences of chemistry or zoology; and, as an intellectual supplement to the too-engrossing "accomplishments," and a variation on the acquisition of foreign languages, I venture to suggest that the teaching of this science, even in its higher branches, may be continued in the case of the gentler sex throughout the school course. The education of boys, perhaps, is a different matter. Greek and the higher mathematics demand much time, whilst German is almost equally essential. Many parents, moreover, about this stage, begin, perhaps too hastily, to think of special or technical training; in few branches of which will botany be as useful as Chemistry, Physics, or Mechanics. From thirteen to sixteen, then, boys had better perhaps not study this science; but I would urge on all students for the medical profession the importance of matriculating, and taking at least the initial step towards a science degree, such as the Preliminary Scientific Examination of the London University, before commencing their professional studies at a Hospital. They will find this an immense saving of time and trouble. In order to do so, they should have gone through what I here term the second year's work, which presupposes a knowledge of at least the first eight chapters of *Oliver*, which has been mastered at school before the age of thirteen.

(To be continued.)

NOTES ON THE SCALES OF LEPIDOPTERA.

It would be natural to imagine that the female of *Orygia antiqua* (the Vapourer Moth), has, on its rudimentary wings, scales resembling

those of a *previous* type. The wings are covered, in the first place, with scales very similar to those belonging to the genus Vanessa ; and, secondly, with hairs and hair-like scales of different kinds, showing intermediate gradations between a true scale and hairs.

From this I draw the following conclusions : that the original form of scales was hairs, such as are seen on the wings of Diptera and other more lowly-organised orders of insects ; and that butterflies closely allied to the genus Vanessa were the prototypes of, at least, the Diurnal Lepidoptera.

Other arguments in favour of this theory are that on the Podura the very lowest type of insect scales, very similar to those in Vanessa, are found ; and, again, the only fossil butterfly yet discovered belongs to this genus.* It comes from the Lower Miocene beds of Croatia ; its name is *Vanessa Pluto*, and it resembles *V. Hadena*, which now inhabits India. E. H. H.

NOTES AND QUERIES.

Plant-Superstitions.—May I point out to you that the Bistort is not the same plant as the Spotted Persicaria, and does not possess spotted leaves ; so that your correspondent's identification is unfortunate.

James Britten.

[We see that our correspondent, in taking out the list of names from Culpeper's Herbal (which applied to the *Bistort*) confounded the Bistort with the Persicaria. His *foregoing* remarks, however, have reference to the Persicaria. We thank Mr. Britten for pointing out the error.—Ed.]

Henbane.—I met with *Hyocyamus niger* (Henbane), the other day, at Fotheringham,—a single plant,—making the third station, so far as I know, for Forfarshire, and raising the elevation of the plant's growth to 300 feet above the level of the sea.

Inverarity Manse, Forfar, N.B. Rev. P. Stevenson.

A Green Rose.—A friend sent me some buds and blooms of a green rose, grown in Torquay ; not a *sport*, however the variety may have originated. I have also a drawing made by a lady at Montauban, in the south of France, of a similar rose. The flower is not fragrant.

* We must except *Palæontina Oolitica*, a butterfly of doubtful affinities, found in the Trias.

In Messrs. James Veitch & Sons (Chelsea) Catalogue of Roses, 1881-2, p. 18, it is classed with China Roses as *Viridiflora*, with a note : "green; this is a curious development of the calyx into the form of a flower."

G.H.W., *Torquay.*

PHOSPHORESCENCE IN DECAYED WOOD.—What is the cause of the presence of phosphorescence in decayed wood? My husband and I, when out for a nocturnal walk, picked up a quantity of old wood brilliant with this phosphorescent light. By daylight we could discover nothing. Might it be caused by the presence of those little long red worms with a number of legs, which I discovered the other night also give a light like the glow-worm? M.F.A., *Lompres.*

[Query.—Luminous Centipedes.—ED.]

[For want of space, rest of Notes and Queries must stand over till next month.]

EDITORIAL.

WITH the present number, the first volume of the Second Series of NATURAL HISTORY NOTES is brought to a close; and we take this opportunity of expressing our hearty thanks to those who have given assistance by literary contributions, or by adding names to the list of Subscribers.

We would draw the attention of Subscribers to the Notice inserted inside the cover, it being absolutely necessary, for the due maintenance of the Journal, that Subscriptions should be forwarded on or before the 1st January next.

In conclusion, we would ask our readers, on behalf of the magazine, for their hearty and conjoint support during the coming year.

EXCHANGES.

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